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THE WALSH-SUZZALLO ARITHMETICS

FUNDAMENTAL PROCESSES

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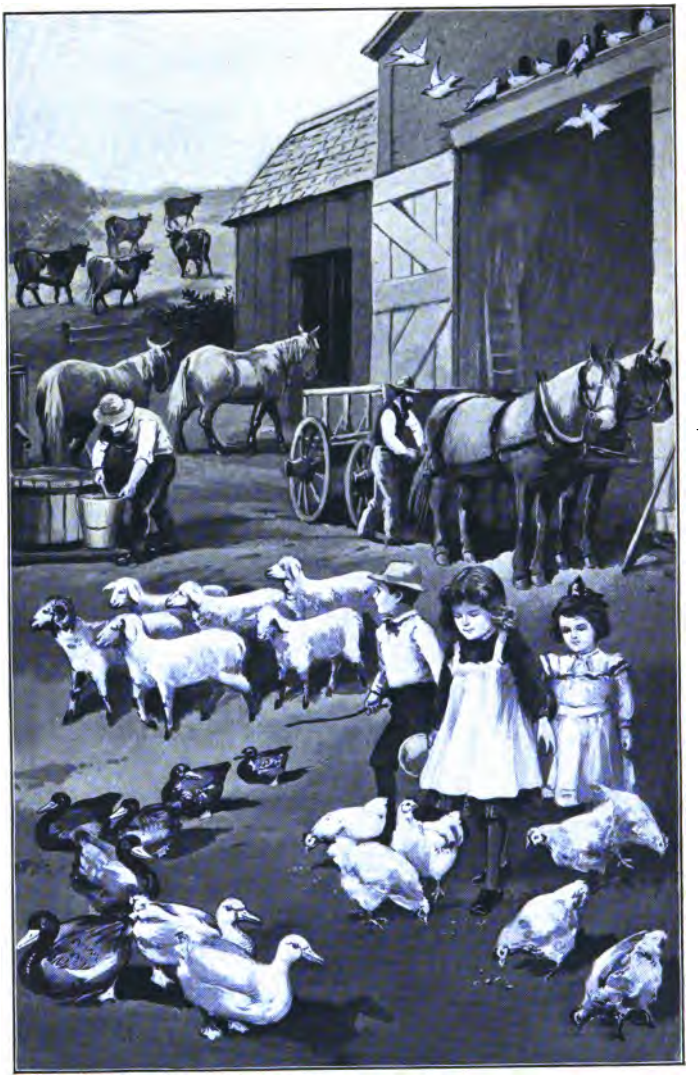

6

WALSH-SUZZALLO ARITHMETICS

BOOK ONE

FUNDAMENTAL PROCESSES

BY

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PREFACE

THESE books are designed to give an elementary school child all the arithmetical power necessary to cope with the situations of common everyday life. A social survey of the usual responsibilities of men has determined omissions and additions. The methods of learning and teaching employed have been indicated by an analysis of thousands of typical arithmetical errors collected in ordinary schools.

Because a standard of social efficiency has been applied throughout, it is expected that the immediate competency of the pupil leaving school will be greatly increased. Because a standard of pedagogical economy has likewise been rigidly observed, it is also expected that the pupils will develop this competency one to two years earlier.

In consequence, this series has been so arranged that a child may acquire an easy and accurate command over all fundamental processes, both simple and complex, by the end of the sixth year. The seventh and eighth school years are thus left free for a study of those business institutions and practices, the understanding of which is vital to an extended use of arithmetic in practical life.

This particular book, the first in a series of two, covers

the fundamental elements of arithmetical manipulation and thought. Thus a child who goes no farther than the fourth or fifth grade will be so familiar with essentials that he can readily learn more arithmetic by himself.

No attempt has been made to project the pupil into unfamiliar situations. His experience is already greater than his power of mathematical interpretation. The teacher of primary arithmetic has accomplished enough when she has taught the child to solve his own problems. Hence, a special effort has been made to keep both examples and problems within the reach of the child.

While abstract work is the chief difficulty of the first school grades, it must ever be remembered that it is always a concrete and personally vital problem which provokes the need to compute. In all development of new technique, the teacher should start with an easy problem actually or orally expressed. Once the child has decided from the concrete situation what he is to do, he should be permitted to do it symbolically or abstractly. Mere drill on combinations, processes, and manipulations may well be abstract, provided the pupil feels the need of such perfection and knows that in the end his facility is to be used in the solution of real problems.

In this text, every new process is introduced by a problem that calls for its use. Similarly, the last drill upon a process is given in the form of oral and written problems. This is to remind the teacher that all abstract work, however important, is merely an intermediate stage in the

effective teaching of arithmetic. Ample provision must be made for concrete work at the beginning and end of all practice upon the mechanics of arithmetic.

The use of more than one way of working an example has been carefully avoided. We should be content with one concrete method of computation, particularly in the primary grades. To attempt to develop two different habits of response to the same situation leads to confusion and waste. Short methods of operation are given only in the higher grades.

Special attention is called to the device used to give the child a clear understanding of the manner in which formal processes are performed. Whenever a process is expressed in figures, each stage of the mental process accompanying it is also expressed in simple language. These parallel language statements take the form of simple directions given in the most economical and efficient order. If the child does not clearly see how the process has been conducted in the course of the teacher's demonstration, reference to the text makes it clear. In establishing a habit it is advantageous to follow an accurate, permanent, and consistent form. It is quite impossible for the teacher to give a great amount of attention to each individual in our large classes, and it is wise to develop in the child the power to understand and practice arithmetical manipulations by himself. In line with this effort to give the child power to care for himself, the child is constantly taught to test or check his work.

These texts are not a substitute for a good teacher; they are an important and necessary aid. They aim to be efficient and economical guides to both teacher and pupil. The topics, problems, and processes are representative of the arithmetical facts, power, and skill that will be most useful to the average citizen. The methods of treating them have been garnered from the most successful teaching practice.

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ARITHMETIC

FIRST BOOK

SECTION I

INTRODUCTORY REVIEW

Counting

1. How many men are there in the picture on the left-hand page?

2. How many children?

3. How many horses?

4. How many cows?

5. How many sheep?

6. How many hens?

7. How many ducks?

8. How many pigeons are there in the picture?

9. How many doors has the class room?

10. How many windows?

11. How many panes of glass are there in each window?

12 How many rows of desks are there?

13. How many desks are there in each row?

Adding by Ones

1. Sarah has two girl dolls and one boy doll. How many dolls has she?

2. William has three pears in his basket and one pear in his hand. How many pears has he?

3. Of a flock of geese, four are in the pond and one is on the bank. How many geese are there in the flock?

4. Jane spent five cents for a pencil and one cent for a pen. How many cents did she spend for both?

5. John has six cents. If his father gives him one cent, how many cents will he have?

Reading Numbers

One	Two	Three	Four	Five	Six	Seven	Eight	Nine	Ten
1	2	3	4	5	6	7	8	9	10

Sight Drills

Give sums rapidly:

a.	1	1	1	1	1	1	1	1	1
	1	2	3	4	5	6	7	8	9
b.	7	3	5	8	4	9	6	2	9
	1	1	1	1	1	1	1	1	1

Adding by Twos

1. Arthur has two large rockets and two small ones. How many rockets has he?

2. How many are two and two?

3. Ann rode three miles on the cars and two miles in the stage. How many miles did she ride?

4. How many are three and two? 2 and 3?

5. Fred has four cents in his bank. How many cents will be in the bank after he puts into it two more cents?

6. How many are four and two? 2 and 4?

7. There are five pears on one plate and two on another. How many pears are there on both plates?

8. How many are five and two? 2 and 5?

9. Helen found six eggs in one nest and two in another. How many eggs did she find?

10. How many are six and two? 2 and 6?

11. Harry is seven years old and his sister Mary is two years older. How old is Mary?

12. How many are seven and two? 2 and 7?

13. There are eight children now in the room. How many will there be when two more come?

14. How many are eight and two? 2 and 8?

Measuring

1. How many paces across the class room?

2. How many paces are there in the length of the class room?

3. How many glassfuls will the pitcher hold?

4. How many pitcherfuls will the pail hold?

5. How many glassfuls will the pint hold?

6. How many pints will the quart hold?

7. How many quarts will the pitcher hold?

8. How many quarts will the pail hold?

Playing Store

9. Use cents to pay for articles costing:

(*a*) Four cents; (*b*) six cents; (*c*) three cents; (*d*) Two cents; (*e*) five cents; (*f*) seven cents.

10. How many cents are there in a nickel?

11. Using a nickel and cents, pay for articles costing: (*a*) Six cents; (*b*) eight cents; (*c*) ten cents; (*d*) nine cents; (*e*) seven cents.

12. How many cents are there in a dime?

13. How many nickels are there in a dime?

14. How many cents are there in two nickels?

15. If you have three cents and a nickel in your pocket how many cents have you?

16. If you have one cent and a nickel?

17. If you have four cents and a nickel?

18. If you have two cents and a nickel?

Reading and Writing Numbers

Ten is written 10. Eleven is written 11.

Twelve is written 12. Thirteen is written 13.

Write: Fourteen; fifteen; sixteen; seventeen; eighteen; nineteen.

Read the following:

16, 18, 13, 19, 15, 12, 10, 14.

1. How many cents in a dime? In two dimes? In three dimes? In four dimes? In five dimes? In six dimes? In seven dimes? In eight dimes? In nine dimes?

Twenty is written 20. Thirty is written 30.

Forty is written 40. Fifty is written 50.

Write: Sixty; seventy; eighty; ninety.

Twenty-one is written 21. Fifty-four is written 54.

Forty-three is written 43. Thirty-two is written 32.

Read the following:

22, 33, 44, 51, 65, 78, 86, 92.

The right-hand figure of a number is called the *ones'* figure.

Drill Exercises

Add:

a.	2	6	2	3	2	4	2	10
	8	2	9	2	5	2	7	2
b.	7	2	5	2	8	2	9	2
	2	6	2	4	2	3	2	10

Adding by Threes

1. There are three roses on one bush and three on another bush. How many roses are there on both bushes?

2. How many are three and three?

3. Mr. Smith sold four pigs to one man and three to another. How many pigs did he sell?

4. How many are four and three? 3 and 4?

5. A girl spent five cents for ice cream and three cents for cake. How much did she spend?

6. How many are five and three? 3 and 5?

7. There are six quarts of milk in one can and three quarts in another. How many quarts are there in both cans?

8. How many are six and three? 3 and 6?

9. Frank has seven hens and three ducks. How many has he of both?

10. How many are seven and three? 3 and 7?

11. How many fish are in a jar if there are eight gold fish and three silver fish in it?

12. How many are eight and three? 3 and 8?

13. Ned has nine marbles in a bag and three in his pocket. How many marbles has he?

14. How many are nine and three? 3 and 9?

Adding by Fours

1. There are four boys and four girls in a car. How many children are there in the car?

2. How many are four and four?

3. A girl has a five-cent piece and four pennies in her bank. How much money is there in the bank?

4. How many are five and four? 4 and 5?

5. Along the walk there are six maple trees and four elms. How many trees are there?

6. How many are six and four? 4 and 6?

7. James has seven pounds of flour in his basket. The basket weighs four pounds. How many pounds do both weigh?

8. How many are seven and four? 4 and 7?

9. Mary is eight years old. Her brother is four years older. How old is her brother?

10. How many are eight and four? 4 and 8?

11. If a book cost nine cents and a pad cost four cents, how much will both cost?

12. How many are nine and 4? 4 and 9?

Counting

1. Count by 2's to twenty. By 3's to eighteen. By 4's to twenty. By 5's to ninety. By 10's to ninety.

2. Count by 2's to eight, then by 4's to twenty.

3. Count by 3's to fifteen, then by 5's to forty.

Adding by Fives

1. A boy has five marbles in one hand and five in the other. How many has he in both hands?

2. How many are five and five?

3. One hen has six chickens, and another hen has five. How many chickens have both hens?

4. How many are six and five? 5 and 6?

5. It is now seven o'clock. What time will it be in five hours?

6. How many are seven and five? 5 and 7?

7. John picks eight quarts of berries and Thomas picks five quarts. How many quarts do both boys pick?

8. How many are eight and five? 5 and 8?

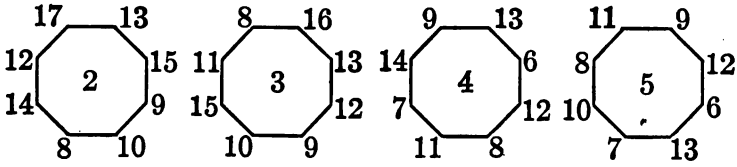
9. My peach tree is nine feet high and my pear tree is five feet higher. How high is the pear tree?

10. How many are nine and five? 5 and 9?

11. John took five steps to the right and then four steps straight ahead. How many steps did he take?

12. How many are four and five? 5 and four?

Blackboard Drills



Sight Drills

Give answers rapidly:

	A	*B*	*C*	*D*	*E*	*F*	*G*	*H*	*I*
a.	1	2	3	4	5	6	7	8	9
	4	4	4	4	4	4	4	4	4
b.	1	2	3	4	5	6	7	8	9
	5	5	5	5	5	5	5	5	5
c.	4	4	4	4	4	4	4	4	4
	2	5	3	6	1	7	9	0	8
d.	5	5	5	5	5	5	5	5	5
	7	1	6	8	2	4	9	0	3

Measuring

1. Measure the length of a book in inches. The width.

2. Measure the length and the width of a pane of glass.

3. Find the length of the class room in feet. Its breadth in feet.

4. Find the length and the breadth of the school yard in feet.

5. Find the dimensions of the blackboard. Of the door. Of a window.

6. How many inches are there in a foot?

7. Find the number of inches in one half foot.

Sight Drills

Give sums. Add upward.

	A	*B*	*C*	*D*	*E*	*F*	*G*
a.	4	4	4	4	4	4	4
	14	24	34	44	54	64	74
b.	6	6	6	6	6	6	6
	22	32	42	52	62	72	82
c.	8	8	8	8	8	8	8
	11	21	31	41	51	61	71
d.	7	7	7	7	7	7	7
	32	42	52	62	72	82	92
e.	8	7	6	5	4	3	2
	21	31	41	51	61	71	81
f.	2	3	4	5	6	7	6
	32	42	52	62	72	82	92
g.	4	5	6	3	2	1	5
	23	53	43	73	93	63	33

Say 15, 16; 25, 29; etc.

h.	1	4	3	1	4	4	3
	2	1	2	2	1	5	4
	13	24	33	44	54	60	71
i.	21	36	44	57	63	72	83
	7	2	1	1	2	4	5
	1	1	2	1	4	2	1

Addition

Written Exercises

Add:

Before working these written exercises, give orally the sum of each column in an example, beginning with the ones' column.

	A	*B*	*C*	*D*	*E*	*F*	*G*
a.	24	62	71	43	25	47	23
	62	36	26	34	52	22	64
b.	61	43	18	35	63	54	47
	27	36	61	54	22	33	32
c.	74	43	28	64	53	35	65
	15	45	71	35	45	24	33
d.	11	95	63	50	32	32	23
	15	2	31	14	32	23	24
	32	1	5	35	32	32	32
e.	32	21	41	21	51	22	32
	22	32	5	34	3	32	32
	4	23	13	4	12	42	23
f.	12	31	41	42	23	53	32
	52	41	33	16	4	3	33
	4	27	5	11	31	41	32
g.	23	12	14	4	12	62	42
	23	12	3	12	3	4	3
	23	12	21	61	62	3	24

Written Problems

1. A boy earned thirty cents, twenty-five cents, and three cents. How much did he earn?

PROCESS	30c.
Write the numbers under each other, placing the ones' figures of each in a row. Write under each column its sum.	25
	3
	Ans. 58c.

2. Add forty cents, thirteen cents, and six cents.

To save unnecessary repetition, write c. but once in the example and again in the answer.

c. stands for cents.

40c.
13
6
Ans. 59c.

The sign of addition is +, called *plus*.

3. 31 + 42 + 3 + 1.

4. 22 + 33 + 14.

5. Twenty-five boys, plus twelve boys, plus two boys.

6. Ten cows, plus twenty-six cows, plus three cows.

7. A farmer has twenty-four cows in one field and fourteen in another field. How many cows has he in both fields?

8. Mr. Smith sold eighteen pies Monday and eleven Tuesday. How many did he sell in the two days?

9. A boy paid twenty-five cents for a ball and twelve cents for a bat. How much did he pay for both?

Making Change

Let one pupil represent a storekeeper and another a customer. The latter announces the total of his purchase, giving money to the former, who then hands over the change. The customer satisfies himself of the correctness of the latter, stating its amount. He then becomes the storekeeper and a third pupil becomes a customer.

Make change in the business way. If a half-dollar is given for a thirty-eight cent purchase, the storekeeper hands two cents, saying "thirty-eight, forty"; then a dime, saying "fifty."

Make change for the following purchases:

1. Amount of purchase, 6 cents. Sum given, 25 cents.

2. Amount of purchase, 43 cents. Sum given, 50 cents.

3. Amount of purchase, 11 cents. Sum given, 25 cents.

4. Amount of purchase, 29 cents. Sum given, 35 cents.

5. Amount of purchase, 68 cents. Sum given, 75 cents.

6. Amount of purchase, 8 cents. Sum given, 50 cents.

7. Amount of purchase, 17 cents. Sum given, 25 cents.

8. Amount of purchase, 3 cents. Sum given, 25 cents.

9. Amount of purchase, 27 cents. Sum given, 30 cents.

Subtraction. — Preparatory Exercises

1. If John needs 10 cents for a ball and he already has 5 cents, how many more cents does he require?

2. What number added to 7 will make 14?

3. A boy placed 9 marbles in two piles, one of which contained 5 marbles. How many were there in the other pile?

4. In how many years will a 5-year old girl be 8 years old?

5. A man is making a trip of 6 miles. If he has gone 2 miles already, how many miles has he still to go?

6. Mabel and Samuel together picked 8 quarts of berries. If Samuel picked 3 quarts, how many quarts did Mabel pick?

7. Nine boys are required for a baseball team. Only six have been chosen. How many more must they have?

8. If I buy 7 cents' worth of candy and give the storekeeper a dime, how much change should I receive?

9. There were 10 trees in a grove. After 3 were cut down, how many were left standing?

10. William rode 12 miles in an automobile. How many more miles did he ride than Edwin, who rode only 8 miles?

Drill Exercises

Tell the number that must be added to the lower one to make the upper one:

	A	*B*	*C*	*D*	*E*	*F*	*G*	*H*	*I*
a.	9	8	2	9	3	7	4	9	8
	−1	−7	−1	−8	−1	−6	−2	−6	−1
b.	7	9	3	8	5	6	9	5	4
	−1	−7	−2	−6	−4	−3	−2	−1	−3
c.	9	7	6	8	4	7	6	8	9
	−3	−5	−1	−5	−1	−2	−5	−2	−5
d.	5	7	8	6	7	5	6	8	9
	−2	−3	−4	−2	−4	−3	−4	−3	−4

The sign of subtraction is −, called *minus*.

Subtraction

1. From 86 take 32.

PROCESS

Write 32 under 86, placing the ones' figures of both in the same column. Begin at the ones' column and think 2 and **4** (writing 4) are 6, 3 and **5** (writing 5) are 8.

86
32
54 *Ans.*

Written Exercises

The answer in subtraction is called the *remainder*.

Find remainders:

	A	*B*	*C*	*D*	*E*	*F*
a.	88	59	78	49	76	63
	−41	−34	−15	−28	−33	−41
b.	46	55	67	88	89	54
	−15	−24	−36	−75	−46	−32
c.	79	58	62	85	93	87
	−23	−32	−31	−41	−52	−63
d.	45	86	66	67	64	77
	−44	−21	−45	−33	−22	−32
e.	56	47	83	78	99	65
	−32	−41	−32	−51	−34	−44
f.	63	75	96	48	84	97
	−42	−31	−43	−25	−52	−23

Addition and Subtraction

Sight Exercises

	A	*B*	*C*	*D*	*E*	*F*	*G*
a.	17	21	21	32	37	37	20
	+4	−4	−17	+5	−32	−5	−6
b.	12	19	19	11	19	19	19
	+7	−7	−12	+8	−8	−11	+6

Oral Problems

1. If John spends 5 cents out of a dime, how much change does he get?

2. There were 14 pears on a branch. How many were there after Mary picked off 7?

3. A boy had 9 marbles. How many had he after losing 4 of them?

4. A girl is 8 years old. How old was she 3 years ago?

Oral Drills

The sign of equality is =, called *equals*.

$13+4=17$ means 13 plus 4 equals 17. It may be read "13 and 4 are 17."

$17-4=13$ means 17 minus 4 equals 13. It may be read "17 less 4 are 13."

Give answers:

	A	*B*	*C*	*D*
a.	$14+4=?$	$18-14=?$	$18-4=?$	$24+4=?$
b.	$13+6=?$	$19-13=?$	$19-6=?$	$43+6=?$
c.	$11+3=?$	$14-11=?$	$14-3=?$	$61+3=?$
d.	$12+5=?$	$17-12=?$	$17-5=?$	$32+5=?$
e.	$15+2=?$	$18-16=?$	$18-2=?$	$75+2=?$
f.	$10+9=?$	$19-10=?$	$19-9=?$	$50+9=?$
g.	$14+3=?$	$17-14=?$	$17-3=?$	$84+3=?$
h.	$16+2=?$	$18-16=?$	$18-2=?$	$26+2=?$
i.	$12+7=?$	$19-12=?$	$19-7=?$	$92+7=?$

Addition and Subtraction

Oral Problems

1. In an orchard there are 11 trees in the first row and 10 trees in the second. How many are there in both rows?

2. After plowing 36 acres how many acres must Mr. Jones plow to finish a 40-acre field?

3. I bought goods amounting to 42 cents and received 8 cents in change. How much did I hand the storekeeper?

4. A girl has 44 cents. How many more cents does she need in order to buy a 50-cent doll?

5. There are 18 yards of cloth in one roll and 10 yards in another. How many yards are there in both rolls?

6. After selling 22 dozen eggs, a grocer has 7 dozen left. How many dozen did he have at first?

7. Edward has 24 marbles and Arthur has 6 more than Edward. How many has Arthur?

8. Sarah has 26 cherries. How many will she have if she gives 10 to Jane?

9. Frank is 16 years old. In how many years will he be 21?

10. A boy picked 27 quarts of berries. How many quarts will he have after selling 19?

11. Mr. Jones is 25 years old. How old was he 9 years ago?

Written Problems

1. In an orchard there are 26 trees in the first row and 31 trees in the second row. How many are there in both rows?

2. After cutting 24 acres of wheat, how many more acres will Mr. Wise have to cut to finish a 45-acre field?

3. I bought goods amounting to 52 cents and received 23 cents in change. How much did I hand the storekeeper?

4. A boy has 62 cents. How many more cents does he require in order to buy a 75-cent baseball?

5. There are 23 yards of silk in one roll and 25 yards in another. How many yards are there in both rolls?

6. After selling 22 dozen eggs, a grocer has 16 dozen left. How many dozen did he have at first?

7. Fred has 24 marbles, and George has 15 more than Fred. How many has George?

8. Minnie has 26 cherries. How many will she have if she gives 13 to her brother?

9. Robert is 11 years old. In how many years will he be 27?

10. A girl picked 36 quarts of berries. How many quarts will she have after selling 25?

11. Mr. Smith is 38 years old. How old was he 17 years ago?

Notation and Numeration

One hundred is written 100. Two hundred is written 200. Three hundred, 300.

1. Write in figures (*a*) four hundred. (*b*) Five hundred. (*c*) Six hundred. (*d*) Seven hundred.

One hundred one is written 101.

2. Write in figures (*a*) one hundred three. (*b*) One hundred four. (*c*) One hundred five. (*d*) One hundred six. (*e*) One hundred seven.

One hundred ten is written 110. Two hundred twenty-five is written 225.

3. Write in figures:

a. One hundred twenty. Five hundred thirty-one.
b. Three hundred one. Seven hundred eighty-four.

4. Read the following:

a.	111	202	317	496	500
b.	630	782	867	999	840

In writing *hundreds*, three figures are used. The right-hand figure is called the *ones'* figure, the next is called the *tens'* figure, and the left-hand one is called the *hundreds'* figure.

5. Write in figures:

a. One hundred ninety. Five hundred twenty-two.
b. Two hundred seventy. Six hundred seventy-three.

Adding by 6's. By 7's.

1. There are 6 houses on one side of the street and 6 houses on the other. How many houses are there on both sides?

2. How many are 6 and 6?

3. After spending 7 cents, a girl has 6 cents left. How many cents did she have at first?

4. How many are 6 and 7?

5. Charles has saved 8 cents. He needs 6 cents more to buy a book. How much does the book cost?

6. How many are 6 and 8?

7. If I pick 9 roses, there will be 6 still on the bush. How many are there on the bush?

8. How many are 6 and 9?

9. In a class there are 7 boys and 7 girls. How many pupils are in the class?

10. How many are 7 and 7?

11. A pole was cut into two pieces, one 8 feet long and the other 7 feet long. How long was the pole at first?

12. How many are 7 and 8?

13. After giving 9 cherries to his sister, a boy has 7 left. How many cherries had he?

14. How many are 7 and 9?

Adding by 8's. By 9's

1. How many pies are 8 pies and 8 pies?

2. There are 9 cars in one train and 8 in another. How many cars are there in both?

3. How many are 8 and 9?

4. In a game of ball there are 9 boys on one side and 9 on the other. How many are there on both sides?

Sight Drills

Give sums:

	A	*B*	*C*	*D*	*E*	*F*	*G*	*H*
a.	6	7	8	9	7	8	9	8
	6	6	6	6	7	7	7	7
b.	6	6	6	7	7	8	9	9
	7	8	9	8	9	9	8	9

Sight Exercises

Add the following:

	A	*B*	*C*	*D*	*E*
a.	20	25	20	25	20
	20	10	15	20	30
b.	35	30	30	40	20
	10	15	20	20	40
c.	15	40	15	25	15
	40	15	20	40	30
d.	30	40	50	60	70
	30	40	50	60	70

Written Exercises

1. A rope was cut into three pieces 42, 63, and 24 ft. long. What was the length of the original rope?

PROCESS

Begin at the bottom. Think 7, 9; write 9. Think 8, 12; write 12.

42 ft.
63
24
Ans. 129 ft.

2. Add:

	A	*B*	*C*	*D*	*E*
a.	33	40	70	92	75
	20	63	80	80	3
	54	25	3	16	61
b.	64	27	33	40	93
	14	91	4	73	93
	80	1	81	25	93
c.	102	122	306	5	620
	203	122	50	203	113
	10	122	401	30	204
d.	620	90	140	30	120
	61	305	200	304	302
	3	402	24	43	416
e.	234	82	311	232	143
	40	105	25	32	143
	121	12	123	232	143

Addition with Carrying

3. Add 53, 136, 78, and 684.

PROCESS	
Begin with the ones' column. Think 12 (4 + 8), 18, 21; write 1 and carry 2. Think 10 (2 + 8), 17, 20, 25; write 5 and carry 2. Think 8 (2 + 6), 9; write 9.	53 136 78 684 *Ans.* 951

4. Find sums:

	A	*B*	*C*	*D*	*E*
a.	64	20	23	16	5
	33	15	64	5	23
b.	127	357	227	117	215
	26	14	7	119	8
	25	2	321	103	342
c.	140	27	33	25	32
	56	18	33	15	359
	4	9	234	8	80
d.	123	234	345	456	203
	47	58	207	345	88
	6	9	163	20	8
e.	449	909	175	473	219
	81	44	184	250	62
	314	30	400	26	105
	5	16	37	105	30

Testing Results

5. Add 278, 166, 37, and 69.

TEST

After obtaining the sum by adding the columns upward, test the result by adding the columns downward, thus: 14, 21, 30; 10, 16, 19, 25; 4, 5.

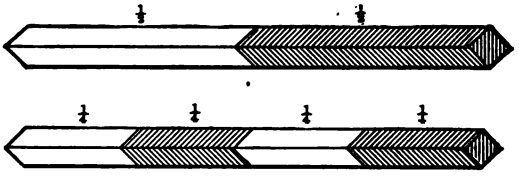
278
166
37
69
Ans. 550

6. Find sums. Test:

	A	*B*	*C*	*D*	*E*
a.	35	160	313	464	7
	323	48	46	203	322
	150	204	65	45	48
b.	106	220	27	423	152
	38	417	341	240	236
	23	75	35	86	324
	400	130	305	100	88
c.	606	108	22	40	200
	70	75	123	38	106
	147	6	34	50	84
	1	201	5	527	40
	32	2	580	44	35

d. 26 + 26 + 26 + 26.
e. 45 + 45 + 45 + 25.
f. 34 + 26 + 101 + 5.
g. 4 + 89 + 25 + 103.
h. 34 + 605 + 21 + 83.
i. 210 + 35 + 406 + 54.
j. 25 + 27 + 320 + 105.
k. 84 + 106 + 50 + 19.

One Half. One Quarter



One half is written $\frac{1}{2}$. One quarter is written $\frac{1}{4}$.

Fold circles, squares, etc., to show that a half is one of the two equal parts of a thing, and that a quarter is one of its four equal parts.

Oral Examples

1. How many halves in a pie? How many quarters?

2. If a boy eats one quarter of a pie, how many quarters are left?

3. How many quarters of a pie are there in half a pie?

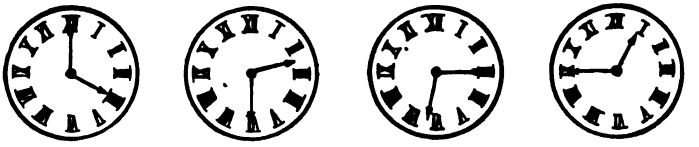
4. If a half of a pie costs 10 cents, what is the cost of the whole pie?

5. Find the cost of a quarter of a pie when a half pie costs 10 cents.

6. When milk costs 6 cents a quart, what does a pint cost?

7. There are 12 eggs in a dozen; how many eggs are there in a dozen and a half?

Roman Numbers



Letters are sometimes used to express numbers, especially in clocks and watches, also in chapters of books, etc.

I represents 1	VII represents 7
II represents 2	VIII represents 8
III represents 3	IX represents 9
IV represents 4	X represents 10
V represents 5	XI represents 11
VI represents 6	XII represents 12

On the face of a clock IIII is used to represent 4.

Telling Time

1. If the minute hand goes 12 spaces in an hour, how many spaces does it go in one half hour?

2. What time is it when the minute hand points to XII and the hour hand to IIII?

3. Tell the time when the minute hand is at VI and the hour hand is halfway between II and III.

4. When it is a quarter-past six, where is the minute hand? The hour hand?

5. When it is a quarter to one, where is the minute hand? The hour hand?

6. What is $\frac{1}{2}$ of 12? $\frac{1}{4}$ of 12?

Addition and Subtraction

Oral Problems

1. A man had 50 bushels of tomatoes. He sold all but 4 bushels. How many bushels did he sell?

2. A girl had 50 cents. How many cents had she after spending 41 cents?

3. A cheese weighed 45 pounds and the box weighed 10 pounds. How many pounds did both weigh?

4. A boy had 36 firecrackers after he had shot off 9. How many had he at first?

5. I gave the grocer 75 cents and he gave me 9 cents change. What did the goods cost?

6. A telegraph pole is 24 feet above the ground and 6 feet in the ground. How long is the pole?

7. There are 15 flowers on one bush and 8 on another. How many are there on both?

8. How many days are there from December 15 to December 25?

9. A farmer has 42 sheep. How many more must he buy in order to have 50?

10. Find the total cost of 28 cents' worth of cake and 9 cents' worth of candy.

11. One day a boy rode to a town 25 miles distant and back again. How far did he ride?

Written Problems

1. A man had 75 bushels of potatoes. He used 21 bushels and sold the rest. How many bushels did he sell?

2. A boy had 75 cents. How many cents had he after spending 33 cents?

3. A cheese weighed 48 pounds and the box weighed 12 pounds. What was the weight of both?

4. A girl had 36 cherries after giving 36 to her brother. How many did she have at first?

5. I gave the baker 25 cents and he gave me 11 cents change. What did the goods cost?

6. A flag pole is 38 feet above the ground and 12 feet in the ground. How long is it?

7. There are 37 roses on one bush and 29 on another. How many are there on both?

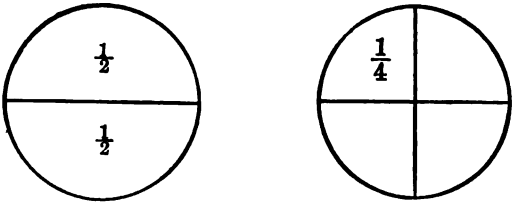
8. How many days are there from March 13 to March 29?

9. A farmer has 24 sheep. How many does he need in order to have 37?

10. What is the total cost of 28 cents' worth of coffee and 22 cents' worth of sugar?

11. A city is 48 miles away. How many miles does a person ride in going and returning?

Equal Parts



1. Fold a paper circle into two equal parts. What is each part called? One half is written $\frac{1}{2}$.

2. Fold a paper circle into four equal parts. What is each part called? One fourth is written $\frac{1}{4}$.

3. Fold a paper square into three equal parts. Each part is called one third. One third is written $\frac{1}{3}$.

4. Fold a paper square into six equal parts. Each part is called one sixth. One sixth is written $\frac{1}{6}$.

5. How many thirds are there in a pie? How many sixths?

6. How many sixths in one half a pie? In one third of a pie?

Quart and Peck

NOTE. The pupil should discover by measuring that there are 8 quarts in a peck.

1. How many quarts are there in a peck?

2. Change 2 pecks to quarts.

3. Change 16 quarts to pecks.

4. If I feed a quart of grain every day to my chickens, how long will a peck last?

5. If I feed them 2 quarts of grain every day how long will a peck last?

Subtraction

Written Exercises

1. Find the difference between 90 and 74.

PROCESS

$$\begin{array}{r} 90 \\ -74 \\ \hline 16 \end{array}$$ *Ans.*

Write the larger number, 90, above the smaller. Begin at the ones' column.

Since 4 is greater than 0, think 4 and **6** (writing 6) are 10. Carry 1 to 7 which makes 8. Think 8 and **1** (writing 1) are 9.

Test by adding 16 and 74 upward: thinking 6 and 4, 2 (carrying 1) and 7.

2. Subtract. Test:

	A	*B*	*C*	*D*	*E*
a.	31	46	92	84	63
	−19	−27	−79	−69	−48
b.	50	92	83	30	63
	−25	−75	−26	−15	−35
c.	63	92	84	72	50
	−24	−65	−15	−36	−26
d.	61	66	90	81	60
	−19	−27	−19	−69	−15
e.	81	76	56	70	82
	−29	−27	−28	−25	−36
f.	93	75	82	61	54
	−46	−38	−26	−38	−27

2. From 318 take 276.

PROCESS

318
276
42 *Ans.*

Think 6 and **2** (writing 2) are 8. Think 7 and **4** (writing 4) are 11. Carry 1 to 2, which makes 3. As this is the same as the upper number, do not write anything under the hundreds' column.

Subtract:

	A	*B*	*C*	*D*	*E*
a.	239	327	479	569	648
	−156	−246	−382	−481	−560
b.	725	878	915	879	712
	−654	−792	−830	−693	−651
c.	625	568	449	316	229
	−571	−475	−365	−294	−195

3. Subtract 92 from 500.

PROCESS

500
−92
408 *Ans.*

Think 2 and **8** (writing 8) are 10. Carry 1 to 9, which makes 10. Think 10 and **0** (writing 0) are 10. Carry 1. Think 1 and **4** (writing 4) are 5.

	A	*B*	*C*	*D*	*E*
a.	900	800	700	600	500
	−75	−63	−37	−44	−88
b.	311	311	100	100	100
	−91	−291	−50	−95	−15

Review Exercises

In addition and in subtraction the numbers have names, as follows:

Addition			Subtraction		
	256	*Addend*		512	*Minuend*
	+256	*Addend*		−256	*Subtrahend*
Ans.	512	*Sum*	*Ans.*	256	*Difference*

In subtraction the difference is also called the *remainder*.

1. Find sums. Test:

a. 198 + 73 + 206 + 5 + 382.

b. 46 + 514 + 103 + 8 + 29.

c. 184 + 291 + 332 + 45 + 9.

d. 55 + 326 + 84 + 173 + 270.

e. 321 + 78 + 97 + 84 + 259.

2. Find differences. Test:

f. 321 − 259.

g. 840 − 326.

h. 270 − 73.

i. 514 − 29.

j. 382 − 206.

k. 291 − 184.

l. 665 − 486.

m. 533 − 486.

n. 910 − 707.

o. 623 − 341.

p. 915 − 876.

q. 824 − 632.

r. 733 − 543.

s. 642 − 438.

t. 551 − 275.

Written Problems

1. A girl has 58 cents. She needs 17 cents more to buy a doll. What is the price of the doll?

2. A farmer raised 75 loads of hay. He used 17 loads and sold the rest. How many loads did he sell?

3. A boy had 75 cents. How much had he after spending 50 cents?

4. When a boy saves 16 cents more, he can buy a 75-cent pair of gloves. How much has he saved already?

5. How much older is a man 50 years old than his son who is 16?

6. How many days from May 14 to Decoration Day, May 30?

7. Mr. Smith is 18 years younger than Mr. Brown, who is 41 years old. How old is Mr. Smith?

8. Jacob caught 17 fish and Horace caught 17 more than Jacob. How many did Horace catch?

9. Mrs. Jones is 27 years old. How old will she be 16 years from now?

10. Mr. Jones is 36 years old. How old was he 18 years ago?

11. A girl has 50 cents; how much will she have if she spends 26 cents?

SECTION II

Preliminary Exercises

1. Add the following:

1	2	3	4	5	6	7	8	9
+1	+2	+3	+4	+5	+6	+7	+8	+9

Instead of writing 1, 2, 3, 4, etc., twice, as examples in addition, they may be written as multiplication examples thus:

1	2	3	4	5	6	7	8	9
×2	×2	×2	×2	×2	×2	×2	×2	×2

These are read 2 times 1, 2 times 2, 2 times 3, etc.

2. How many are 2 times 1? 2 times 2? 2 times 3? 2 times 4? 2 times 5? 2 times 6? 2 times 7? 2 times 8? 2 times 9?

> The sign of multiplication is ×, called *times*.

3. Find the cost of 2 baseballs at 5 cents each.

If 1 baseball costs 5 cents 2 baseballs will cost 2 times 5 cents. *Ans.* 10 cents.

> The answer in multiplication is called the *product*.

Oral Problems

1. How many feet have 2 cows?

2. If I pay 9 cents for 1 bat, how much must I pay for 2 bats?

3. How many desks are there in 2 rows, if there are 8 desks in each row?

4. Mary has 2 nickels. How many cents has she?

5. A boy has 2 pockets and 3 marbles in each. How many marbles has he in both pockets?

6. How many feet have 2 birds?

7. If ribbon cost 6 cents a yard, how many cents will 2 yards cost?

8. How many days are there in 2 weeks?

Blackboard Exercises

Give orally from the blackboard or the book the product of each number beginning at the ones' figure; thus 2 times 0 are 0, 2 times 2 are 4; etc.

	A	*B*	*C*	*D*	*E*	*F*	*G*
a.	20	30	40	21	31	41	22
	× 2	× 2	× 2	× 2	× 2	× 2	× 2
b.	32	42	23	33	43	24	34
	× 2	× 2	× 2	× 2	× 2	× 2	× 2

Written Exercises

	A	*B*	*C*	*D*	*E*
a.	201 × 2	211 × 2	212 × 2	221 × 2	213 × 2
b.	232 × 2	234 × 2	243 × 2	341 × 2	324 × 2

c. Add 206 and 206.

d. Multiply 206 by 2.

	PROCESS	
206 + 206 = 412 *Ans.*	Think 2 times 6 are 12; write 2 and carry 1. Think 2 times 0 are 0; carrying 1 makes 1; write 1. Think 2 times 2 are 4; write 4.	206 × 2 = 412 *Ans.*

e.	216 × 2	250 × 2	126 × 2	345 × 2	237 × 2
f.	450 × 2	307 × 2	208 × 2	109 × 2	245 × 2
g.	356 × 2	449 × 2	380 × 2	279 × 2	165 × 2
h.	259 × 2	316 × 2	478 × 2	156 × 2	209 × 2

Review

1. How many are 2+2+2? Three 2's are how many? Two 3's are how many?

2. How many are 2+2+2+2? Four 2's are how many? Two 4's are how many?

3. How many are 2+2+2+2+2? Five 2's are how many? Two 5's are how many?

4. How many are six 2's? Two 6's?

5. How many are seven 2's? Two 7's?

6. How many are eight 2's? Two 8's?

7. How many are nine 2's? Two 9's?

Oral Problems

1. What is the cost of five 2-cent postage stamps?

2. How many legs have 8 birds?

3. James is 6 years old; his brother is twice as old. How old is his brother?

4. At 2 marbles for a cent, how many marbles can I buy for 6 cents?

5. Find the cost of 9 rockets at 2 cents each.

6. How many pints are there in 4 quarts?

7. How many cents are there in 2 dimes?

8. If a family uses 2 quarts of milk a day, how many quarts will be used in a week?

9. How many shoes in nine pairs?

Memorize the Following Tables

Two times 1 are 2	One time 2 is 2
Two times 2 are 4	Two times 2 are 4
Two times 3 are 6	Three times 2 are 6
Two times 4 are 8	Four times 2 are 8
Two times 5 are 10	Five times 2 are 10
Two times 6 are 12	Six times 2 are 12
Two times 7 are 14	Seven times 2 are 14
Two times 8 are 16	Eight times 2 are 16
Two times 9 are 18	Nine times 2 are 18

Written Exercises

Multiply:

	A	*B*	*C*	*D*	*E*
a.	20	22	21	20	21
	× 3	× 4	× 5	× 6	× 7
b.	20	21	22	12	21
	× 5	× 6	× 7	× 8	× 9
c.	102	102	102	102	102
	× 3	× 4	× 5	× 6	× 7
d.	102	102	112	112	112
	× 8	× 9	× 5	× 7	× 6
e.	122	122	122	122	122
	× 6	× 7	× 5	× 4	× 3

Dividing by 2

Preliminary Exercises

1. How many 2's are there (*a*) in 4? (*b*) In 2? (*c*) In 8? (*d*) In 0? (*e*) In 16? (*f*) In 10? (*g*) In 12? (*h*) In 14? (*i*) In 6? (*j*) In 18?

These examples may be written thus:

(*a*) $2\overline{)4}$? (*b*) $2\overline{)2}$? (*c*) $2\overline{)8}$? (*d*) $2\overline{)0}$? (*e*) $2\overline{)16}$?

(*f*) $2\overline{)10}$? (*g*) $2\overline{)12}$? (*h*) $2\overline{)14}$? (*i*) $2\overline{)6}$? (*j*) $2\overline{)18}$?

2. Give answers.

Oral Problems

1. How many 2-cent postage stamps can I buy for 10 cents?

2. William is 12 years old. He is twice as old as his brother. How old is his brother?

3. How many 2-cent rockets can be bought for 18 cents?

4. If 2 marbles cost 1 cent, how many cents will 12 marbles cost?

5. How many quarts are there in 8 pints?

6. In 16 shoes how many pairs?

Sight Exercises

	A	*B*	*C*	*D*	*E*	*F*
a.	$2\overline{)44}$	$2\overline{)48}$	$2\overline{)42}$	$2\overline{)46}$	$2\overline{)60}$	$2\overline{)66}$
b.	$2\overline{)64}$	$2\overline{)68}$	$2\overline{)62}$	$2\overline{)80}$	$2\overline{)84}$	$2\overline{)88}$

Written Exercises

1. Divide 608 by 2.

PROCESS

Begin at the hundreds' figure. Think 2 into 6 (goes) 3 times, and write 3 directly under the 6; think 2 into 0 (goes) 0 times, and write 0 directly under the 0; think 2 into 8 (goes) 4 times, and write 4 directly under the 8.

2)608
304 *Ans.*

2. Divide:

	A	*B*	*C*	*D*
a.	2)264	2)668	2)482	2)864
b.	3)360	3)666	4)484	4)888

3. Divide 186 by 2.

Since 1 does not contain 2, think 2 into 18 (goes) 9 times, write 9 under the 8, etc.

2)186
93 *Ans.*

	A	*B*	*C*	*D*
a.	2)126	2)148	2)160	2)184
b.	5)105	6)126	7)147	8)168

4. Divide 778 by 2.

Say 2 into 7 (goes) 3 times and 1 over; 2 into 17 (goes) 8 times and 1 over; 2 into 18 (goes) 9 times.

2)778
Ans. 389

5. Find quotients:

	A	*B*	*C*	*D*
a.	2)376	2)532	2)792	2)942
b.	2)110	2)276	2)830	2)706
c.	2)310	2)216	2)912	2)138

6. Divide:

	A	*B*	*C*	*D*
a.	3)363	5)510	7)784	3)606
b.	5)610	7)854	3)366	5)605
c.	8)896	4)484	6)612	8)816
d.	4)880	6)732	9)108	9)918

7. What is $\frac{1}{2}$ of 52?

$\frac{1}{2}$ of 52 = 26 *Ans.* Divide 52 by 2.

8. Give answers:

a. $\frac{1}{2}$ of 72. *c.* $\frac{1}{2}$ of 30. *e.* $\frac{1}{2}$ of 56.

b. $\frac{1}{2}$ of 36. *d.* $\frac{1}{2}$ of 54. *f.* $\frac{1}{2}$ of 70.

g. What is $\frac{1}{4}$ of 88?

$\frac{1}{4}$ of 88 = 22 *Ans.* Divide 88 by 4.

a. $\frac{1}{4}$ of 840. *d.* $\frac{1}{4}$ of 488. *g.* $\frac{1}{4}$ of 804.

b. $\frac{1}{4}$ of 480. *e.* $\frac{1}{4}$ of 840. *h.* $\frac{1}{4}$ of 484.

c. $\frac{1}{4}$ of 800. *f.* $\frac{1}{4}$ of 408. *i.* $\frac{1}{4}$ of 844.

Oral Problems

1. What is the cost of $\frac{1}{2}$ pound of 20-cent coffee?

2. A boy has 15 packs of firecrackers. How many packs will he have after he has shot off 5 packs?

3. There are 14 boys and 11 girls in a class. How many pupils are there in the class?

4. A man has 62 apple trees and 53 peach trees. How many more apple trees has he than peach trees?

5. In a class of 24 pupils the number of boys and of girls is the same. How many are there of each?

6. How many oranges are 2 dozen oranges?

7. How many ears of corn are there on 9 stalks if there are 2 ears on each stalk?

Written Problems

1. What is the cost of $\frac{1}{2}$ yard of 70-cent silk?

2. A man has 50 packs of firecrackers How many will he have after he sells 15 packs?

3. There are 24 boys and 26 girls in the park. How many children are there in the park?

4. A man has 62 apple trees and 26 peach trees. How many more apple trees has he than peach trees?

5. There are 60 trees in 5 equal rows. How many trees are there in each row?

6. How many oranges are 7 dozen oranges?

7. How many ears of corn are there on 19 stalks if there are 2 on each stalk?

Multiplying by 3

Preliminary Exercises

1. Add the following:

3	4	5	6	7	8	9
3	4	5	6	7	8	9
3	4	5	6	7	8	9

2. Copy the following, and fill the blanks. Learn the table.

3 times 1 are—. 3 times 4 are—. 3 times 7 are—.
3 times 2 are—. 3 times 5 are—. 3 times 8 are—.
3 times 3 are—. 3 times 6 are—. 3 times 9 are—.

Blackboard Exercises

Give products:

	A	*B*	*C*	*D*	*E*	*F*
a.	30	40	50	60	70	80
	× 3	× 3	× 3	× 3	× 3	× 3
b.	90	81	72	63	52	41
	× 3	× 3	× 3	× 3	× 3	× 3

Written Exercises

Multiply:

	A	*B*	*C*	*D*	*E*
a.	104	205	306	207	308
	× 3	× 3	× 3	× 3	× 3
b.	139	228	317	246	154
	× 3	× 3	× 3	× 3	× 3

Dividing by 3

Blackboard Exercises

	A	*B*	*C*	*D*
a.	3)270	3)180	3)690	3)219
b.	3)120	3)150	3)156	3)390
c.	3)240	3)210	3)123	3)696

Written Exercises

Divide:

	A	*B*	*C*	*D*
a.	3)372	3)117	3)945	3)402
b.	3)459	3)288	3)876	3)504
c.	3)675	3)135	3)798	3)705
d.	3)750	3)258	3)621	3)801
e.	3)543	3)177	3)510	3)948

Multiplication and Division

Find answers:

	A	*B*	*C*	*D*
a.	233×4	103×9	123×4	132×6
b.	4)928	9)927	4)532	6)798
c.	123×5	113×8	132×5	131×6
d.	5)665	8)984	5)515	7)791
e.	123×7	123×6	103×8	113×5

Oral Problems

1. If there are 8 desks in a row, how many desks are there in 3 rows?

2. A boy has 20 cherries. How many will he have after he gives 3 away?

3. At 3 for a cent what will be the cost of 15 marbles?

4. After selling 17 quarts of milk a man has 3 quarts left; how many quarts had he at first?

5. What does a man gain if he buys a cow for $27 and sells it for $30?

6. Find the cost of 3 pounds of sugar at 6 cents a pound.

7. At 3 cents a mile how far can I ride in a train for 21 cents?

8. A girl buys 21 cents' worth of bread. She gives the baker 25 cents. How much change does he give her?

9. How many days are there from December 21 to December 25?

10. At 3 cents each, how many pads can be bought for 15 cents?

11. Four years ago a boy was seven. How old is he now?

12. How many weeks are there in 21 days?

Written Problems

1. If there are 15 desks in a row how many desks are there in 3 rows?

2. A boy has 31 marbles. How many will he have if he gives 12 away?

3. At 3 for a cent what will be the cost of 45 marbles?

4. After selling 17 quarts of milk a man has 23 quarts left; how many quarts had he at first?

5. What does a man gain if he buys a cow for $27 and sells it for $41?

6. Find the cost of 3 pounds of lard at 15 cents a pound.

7. At 3 cents a mile how far can I ride in a train for 81 cents?

8. A girl buys 21 cents' worth of bread. She gives the baker 50 cents. How much change does he give her?

9. How many days are there from June 13 to June 30?

10. At 3 cents each how many pads can be bought for 45 cents?

11. Fourteen years ago a man was 26. How old is he now?

12. How many weeks are there in 98 days?

Multiplying by 4

1. Count by 4's to 40.

2. Copy the following and fill the blanks. Learn the table.

4 times 1 are—. 4 times 4 are—. 4 times 7 are—.
4 times 2 are—. 4 times 5 are—. 4 times 8 are—.
4 times 3 are—. 4 times 6 are—. 4 times 9 are—.

3. Multiply:

	A	*B*	*C*	*D*	*E*
a.	14	24	34	44	234
	× 4	× 4	× 4	× 4	× 4
b.	25	35	45	55	245
	× 4	× 4	× 4	× 4	× 4
c.	36	46	56	66	156
	× 4	× 4	× 4	× 4	× 4
d.	47	57	67	77	167
	× 4	× 4	× 4	× 4	× 4
e.	58	68	78	88	188
	× 4	× 4	× 4	× 4	× 4
f.	69	79	89	99	199
	× 4	× 4	× 4	× 4	× 4

Dividing by 4

Divide.

	A	*B*	*C*	*D*
a.	4)456	4)496	4)536	4)476
b.	4)936	4)976	4)500	4)540
c.	4)580	4)620	4)980	4)544
d.	4)584	4)624	4)664	4)984
e.	4)668	4)708	4)628	4)700
f.	4)712	4)672	4)632	4)752
g.	4)760	4)796	4)788	4)780

Multiplication and Division

Find answers:

	A	*B*	*C*	*D*
a.	144 × 5	144 × 6	134 × 7	124 × 8
b.	5)720	6)804	7)868	8)912
c.	104 × 9	123 × 8	124 × 7	134 × 5
d.	9)936	8)992	7)798	5)670
e.	114 × 6	114 × 7	114 × 8	103 × 9
f.	6)204	7)308	8)272	9)396

Oral Problems

1. When $\frac{1}{2}$ pound of candy costs 10 cents, what is the cost of a pound?

2. When there are 8 desks in each row, how many desks are there in 4 rows?

3. A woman had 40 chickens; how many had she after selling 32?

4. Find the cost of $\frac{1}{4}$ yard of linen at 28 cents per yard.

5. At 4 for a dollar, how many dollars would 16 baseballs cost?

6. At 4 yards for a dollar, how many yards can be bought for $5?

7. A boy earned 50 cents. He spent all but 7 cents. How much did he spend?

8. If a man saves $8 each month, how much does he save in 4 months?

9. A farmer bought a cow for $36 and sold it for $4 more. How much did he get for it?

10. A girl divides a number by 4 and her answer is 8. What is the number?

11. A farmer had 42 sheep. How many would he have if he bought 8 more?

12. If 4 boys take 4 days to do a piece of work, how long would it take 1 boy to do it?

Written Problems

1. When $\frac{1}{2}$ pound of candy costs 16 cents, what is the cost of a pound?

2. When there are 13 desks in each row, how many desks are there in 4 rows?

3. A woman had 40 chickens; how many had she after selling 28?

4. Find the cost of $\frac{1}{4}$ yard of silk at 56 cents per yard.

5. At 4 for a dollar, how many dollars would 60 baseballs cost?

6. At 4 yards for a dollar, how many yards could be bought for $12?

7. A boy earned 50 cents. He spent all but 27 cents. How much did he spend?

8. If a man saves $15 each month, how much does he save in 4 months?

9. A man bought a cow for $36 and sold it for $14 more. How much did he get for it?

10. A girl divides a number by 4 and her answer is 16. What is the number?

11. A farmer has 42 sheep. How many would he have if he bought 18 more?

12. If 4 men take 16 days to do a piece of work, how long would it take 1 man to do it?

Multiplying by 5

1. Count by 5's to 100.

2. Copy the following and fill the blanks. Learn the table:

5 times 1 are —. 5 times 4 are —. 5 times 7 are —.
5 times 2 are —. 5 times 5 are —. 5 times 8 are —.
5 times 3 are —. 5 times 6 are —. 5 times 9 are —.

3. Multiply:

	A	*B*	*C*	*D*	*E*
a.	15	25	35	45	55
	×5	×5	×5	×5	×5
b.	26	36	46	56	66
	×5	×5	×5	×5	×5
c.	37	47	57	67	77
	×5	×5	×5	×5	×5
d.	48	58	68	78	88
	×5	×5	×5	×5	×5
e.	59	69	79	89	99
	×5	×5	×5	×5	×5
f.	155	135	105	105	115
	×6	×7	×8	×9	×8
g.	125	145	125	115	55
	×7	×6	×7	×8	×9

Dividing by 5

Divide:

	A	*B*	*C*	*D*
a.	5)625	5)675	5)725	5)775
b.	5)680	5)730	5)780	5)830
c.	5)735	5)785	5)835	5)885
d.	5)790	5)840	5)890	5)940
e.	5)845	5)895	5)945	5)995
f.	6)930	7)875	8)920	9)945
g.	6)330	7)315	8)280	9)225

Examples in division are written in several ways:

Divisor 3)30 *Dividend.* *Dividend* $\frac{30}{3} = 10$ *Quotient.*
Ans. 10 *Quotient.* *Divisor*

Dividend		*Divisor*		*Quotient*
30	+	3	=	10

Sight Exercises

Give answers:

	A	*B*	*C*	*D*
a.	36 + 8	21 + 7	50 − 46	$\frac{1}{4}$ of 32
b.	32 + 8	32 − 4	5 × 9	18 + 7
c.	4 × 4	$\frac{1}{3}$ of 12	27 + 3	25 − 18
d.	32 − 28	44 + 6	$\frac{1}{2}$ of 12	24 + 8
e.	$\frac{1}{2}$ of 16	9 × 5	35 + 7	55 − 9

Pint, Quart, Gallon

1 Pint 1 Quart 1 Gallon

1. How many times will the gallon measure hold the contents of the quart measure?

2. How many quarts are there in a gallon?

3. How many pints are there in a gallon?

4. How many quarts of milk are there in a can of milk containing 10 gallons?

5. When a half pint of ice cream costs 10 cents, what is the cost of a pint?

6. How many pints are there in 2 quarts and 1 pint?

7. How many quarts are there in 3 gallons?

8. How many gallons are there in 16 quarts?

9. How many pints are there in 2 gallons?

10. Learn the following table:

Liquid Measure

TABLE

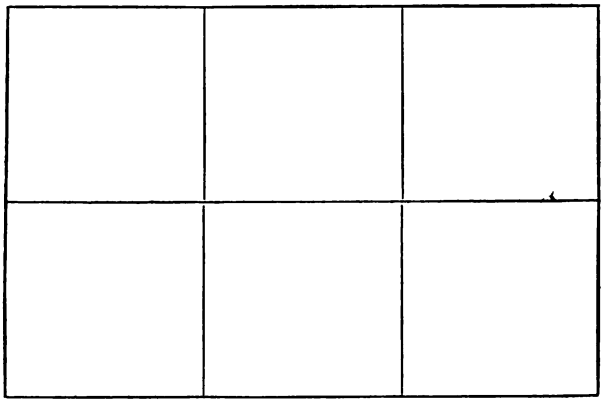
2 pints (pt.)	1 quart (qt.)
4 quarts	1 gallon (gal.)

Liquid measure is used in buying and selling liquids; such as milk, oil, sirup, etc., also ice cream.

Rectangles

1. Make a one-inch cardboard square. This contains 1 square inch.

2. Draw a rectangle 2 inches long, 1 inch wide. Divide it into one-inch squares. How many square inches does it contain?



3. Arrange 6 one-inch squares to form a rectangle 3 inches long, 2 inches wide. What part of the whole rectangle is the rectangle formed by a horizontal row of 3 squares? What part of the whole rectangle is the rectangle formed by a vertical row of 2 squares? What part of the whole rectangle is each square?

4. What part of 6 square inches is 1 square inch? What part of 6 is 3? What part of 6 is 2?

Inch is written *in.*; foot is written *ft.*; square inch is written *sq. in.*

Oral Problems

1. If I pay 5 cents for a quarter of a pound of candy, what is the price of a pound?

2. There are 16 ounces in a pound. How many ounces are there in a quarter of a pound?

3. If a man uses 28 quarts of oil in a year, how many gallons does he use?

4. At 4 cents per quart, what is the cost of a gallon of oil?

5. John has 36 cherries, James has 4 more than John. How many has James?

6. A farmer has 40 cows. How many will he have if he sells 4?

7. How many sheep at $4 each can be bought for $36?

8. What will 4 yards of 9-cent calico cost?

9. There are 36 trees in 4 equal rows. How many are there in each row?

10. If one quarter pound of tea costs 10 cents, what is the cost of one half pound?

11. How many tomato plants will be needed for 9 rows if 10 plants are needed for each row?

12. How many nickels make 20 cents?

13. A girl has in her bank a quarter, a dime, and a nickel. How many cents are there in her bank?

14. How many pints of milk will make 12 half-pint glasses of milk?

Written Problems

1. If I pay 15 cents for a quarter of a pound of tea, what is the price of a pound?

2. There are 144 pens in a gross. How many pens are there in a quarter of a gross?

3. How many gallons are there in 100 quarts?

4. At 18 cents per quart, what will a gallon of paint cost?

5. Thomas has 36 cents; Martha has 24 cents more than Thomas. How much money has Martha?

6. A farmer has 60 sheep. How many will he have if he sells 36?

7. How many sheep at $4 each can be bought for $64?

8. What is the cost of 4 yards of dress goods at 16 cents a yard?

9. There are 96 trees in 4 equal rows. How many are there in each row?

10. If one quarter yard of silk costs 36 cents, what is the cost of one half yard?

11. How many cabbage plants are required for 4 rows if there are 23 plants in each row?

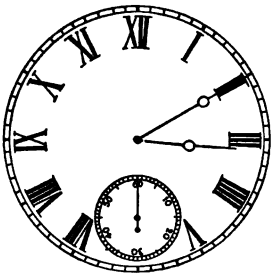
12. How many nickels make 70 cents?

13. How much money are a half dollar, a quarter, a dime, a nickel, and 6 cents?

14. How many pints of lemonade will make 36 half-pint glasses of lemonade?

Time

60 seconds (sec.)	1 minute (min.)
60 minutes	1 hour (hr.)
24 hours	1 day (da.)
7 days	1 week (wk.)



1. How many minutes in $\frac{1}{2}$ hour?

2. The minute hand takes 5 minutes to go from XII to I. How many minutes does it take to go from XII to VI?

3. When the minute hand is at I, it is 5 minutes after the hour. How many minutes is it after the hour when the minute hand points to V? To II? To III?

4. When the minute hand is at VII it is 25 minutes to the next hour. How many minutes to the next hour is it when the minute hand points to IX? To XI? To VIII? To X?

5. Where is the minute hand at 10 minutes after 3? At 20 minutes to 5?

6. What part of an hour space does the hour hand go in 30 minutes? In 15 minutes? In 20 minutes? In 10 minutes?

Roman Numbers

13	14	15	16	17	18	19	20
XIII	XIV	XV	XVI	XVII	XVIII	XIX	XX

Notation and Numeration

1. One thousand is written 1,000. Two thousand is written 2,000.

2. Read: 3,000; 5,000; 7,000; 9,000.

3. Write in figures: four thousand; six thousand; eight thousand.

4. One thousand one is written 1,001. Two thousand six is written 2,006. Three thousand twenty is written 3,020. Six thousand five hundred thirty-six is written 6,536.

5. Write in figures: four thousand three hundred seventy-four; six thousand seven hundred; eight thousand ninety; one thousand sixty-two; seven thousand eight; two thousand five; nine thousand five hundred ninety; one thousand three; five thousand seventy-five; three thousand six hundred seventy-three.

6. Read the following numbers:

A	*B*	*C*	*D*
1,834	9,703	8,046	3,000
4,039	5,000	3,604	4,500
607	750	707	2,908
6,300	2,030	98	5,660
8,270	572	2,345	789
509	1,111	670	1,050
1,062	7,008	2,010	9,590

7. Find the sum of each column.

8. Write in figures:

Six hundred ninety-nine.
Eight hundred five.
Three thousand seven hundred thirty-eight.
Nine thousand eight hundred four.
Two thousand seven hundred twenty-six.
Seven thousand.

9. Add the foregoing.

10. Write the following, and add:

Three thousand sixty-four.
Seven hundred nineteen.
Eighty-two.
Five hundred sixty.
Two thousand three hundred five.
Four hundred.

In a number of four figures the right-hand figure is called the *ones'* figure, the next is called the *tens'* figure, the next is called the *hundreds'* figure, and the left-hand figure is called the *thousands'* figure.

A comma is generally used to separate the thousands' figure from the hundreds' figure, except in numbers representing dates, such as Jan. 1, 1914.

Numbers of four figures are frequently read as hundreds: 1,800 being read as eighteen hundred; 1,912, as nineteen hundred twelve.

Roman Numbers

20 is written XX. 60 is written LX.
30 is written XXX. 70 is written LXX.
40 is written XL. 80 is written LXXX.
50 is written L. 90 is written XC
100 is written C.

A number between 20 and 29, 30 and 39, 40 and 49, etc., is expressed by placing the letter or letters representing the ones after the letter or letters representing the tens.

28 is written XXVIII. 57 is written LVII.
34 is written XXXIV. 72 is written LXXII.
49 is written XLIX. 96 is written XCVI.
63 is written LXIII. 85 is written LXXXV.

Express in Roman numbers:

A	*B*	*C*	*D*	*E*
22	66	82	49	18
33	77	75	31	27
44	88	64	26	32
55	99	59	18	46

Read:

A	*B*	*C*	*D*
XXIII	XLVIII	LXVI	XLV
XXIV	LXVII	XXV	LXIX
LVII	XXXVI	XLII	XXXV
XLIX	XCIX	XXIX	XLVII

NOTE. Owing to their limited application, but little attention should be given to Roman numbers.

Dollars and Cents

Twenty-three dollars five cents is written $ 23.05.

A period, called a *decimal point*, is placed before the cents.

Read the following:

A	*B*	*C*	*D*
$ 4.76	$ 1.25	$ 43.55	$ 805.07
$ 9.83	$ 3.75	$ 27.09	$ 914.30

Write:

1. Five dollars and seventy-nine cents.
2. Eight dollars and sixty-four cents.
3. Forty-two dollars and eight cents.
4. Sixty dollars and sixty cents.

Seventy-five cents is written $ .75.

Sometimes a cipher is written before the decimal point, seventy-five cents being written $ 0.75; and two ciphers may be written after the decimal point when there are no cents, twenty-seven dollars being written $ 27.00.

Read the following:

A	*B*	*C*	*D*	*E*
$ .84	$ 0.16	$ .47	$ 0.05	$ .15
$ .09	$ 0.25	$ .63	$ 0.13	$ .94

Write:

1. Four cents. Twenty cents. Twenty-six cents.
2. Ten cents. Fifty cents. Eighty-five cents.
3. Three cents. Sixty cents. Ninety-nine cents.
4. Seven cents. Eleven cents. Seventy-three cents.

Sight Exercises

Give answers:

	A	*B*	*C*	*D*
a.	\$1.50 + .25	\$0.38 + 0.40	\$.60 + .35	\$3.47 + 1.20
b.	\$2.40 + 2.40	\$0.30 + 0.30	\$ .50 + .80	\$5.60 + 1.15
c.	\$2.40 × 2	\$0.30 × 3	\$.20 × 4	\$1.10 × 5
d.	\$1.50 − .25	\$0.40 + .38	\$.75 − .45	\$3.47 − 1.20
e.	\$1.00 − .05	\$2.00 − .10	\$.50 − .25	\$4.00 − .30
f.	\$2.40 + .60	\$3.50 − 3.25	\$ .60 + .50	\$4.00 + 3.70
g.	\$4.80 / 2	\$0.60 / 3	\$.80 / 40	\$4.40 / 4
h.	\$1.50 × 2	\$0.25 × 4	\$.50 × 3	\$1.12 × 4
i.	\$3.00 / 2	\$1.00 / 5	\$.66 / 22	\$1.60 / 4
j.	\$2.50 + .60	\$2.50 − .60	\$.60 + .45	\$1.60 − .45

Addition

Written Exercises

1. A grocer paid out the following amounts: \$2.84, \$0.47, \$0.09, \$16.56, \$3.25. How much did he pay?

PROCESS

Arrange the numbers so that the decimal points will be in the same column, then add. Place a decimal point in the result under the other decimal points.

Prefix the dollar mark to the first addend and to the sum.

	\$2.84
	.47
	.09
	16.56
	3.25
Ans.	\$23.21

2. Find the sum of \$ 50.75, \$ 18.94, \$ 7.80, \$ 6.66, and \$ 10.95.

PROCESS

Adding upward, the totals of the columns are:

1st column, 11 (ignore 0), 15, 20 (write 0).

2d column, (carrying 2), 11, 17, 25, 34, 41 (write 1).

3d column, (carrying 4 and ignoring 0), 10, 17, 25 (ignoring 0) (write 5).

4th column, (carrying 2), 3, 4, 9 (write 9).

TEST

To test the result, cover it, and add downward.

Adding downward, the totals are:

1st column, 9, (ignoring 0), 15, 20 (write 0).

2d column, (carrying 2), 9, 18, 26, 32, 41 (write 1).

3d column, (carrying 4 and ignoring 0), 12, 19, 25 (ignoring 0) (write 5).

4th column, 7, 8, 9 (write 9).

\$ 50.75
18.94
7.80
6.66
10.95
\$ 95.10

3. Add and test:

a. \$49.62	*b.* \$12.13	*c.* \$36.81	*d.* \$4.23
6.38	8.75	.66	51.75
4.79	24.30	3.75	9.67
.24	3.98	.10	.82
.07	.70	20.99	9.56
e. \$40.09	*f.* \$0.98	*g.* \$6.18	*h.* \$1.43
27.59	62.44	7.29	77.48
1.35	4.85	38.54	4.69
6.47	9.00	.85	5.40
.36	.84	8.00	.41
i. \$9.10	*j.* \$48.57	*k.* \$8.88	*l.* \$56.89
7.45	4.84	17.77	9.99
45.85	6.95	9.00	.48
27.58	5.63	6.38	7.21
6.24	17.77	37.36	20.75

m. \$21.27 + \$7.54 + \$5.68 + \$17.85 + \$0.97.

n. \$26.79 + \$2.15 + \$7.17 + \$0.98 + \$12.49.

4. Find the sum of three dollars nineteen cents, forty-three dollars eight cents, seven dollars, five dollars, five dollars seventy-three cents, and eight cents.

5. Add nine dollars ninety-nine cents, forty-eight dollars sixty-seven cents, eighty-eight cents, seventy-five cents, and nineteen dollars nine cents.

Subtraction

Written Exercises

To test the result, cover the minuend and then add the remainder to the subtrahend, adding upwards: 4 + 9; (carrying 1) 6 + 7; (carrying 1) 5 + 5; (carrying 1) 2 + 2. This sum should be the same as the minuend covered.

$$\begin{array}{r} \$40.33 \\ -25.79 \\ \hline \$14.54 \end{array}$$

1. Find remainders:

	A	*B*
a.	\$18.01 − \$9.43	\$27.44 − \$19.39
b.	\$48.63 − \$8.77	\$82.19 − \$78.90
c.	\$90.50 − \$9.86	\$35.04 − \$16.66
d.	\$35.52 − \$5.83	\$63.15 − \$35.87
e.	\$53.60 − \$8.75	\$70.06 − \$42.19

2. From ninety dollars take ninety cents.

3. Find the difference between sixty dollars sixteen cents and forty-three dollars three cents.

4. From the sum of \$3.50 and \$2.40 take the difference between \$7.50 and \$6.20.

5. From \$10 take the sum of \$3.30, \$2.60, and \$1.50.

6. How many times can 15 cents be subtracted from 75 cents?

7. How many times must 25 cents be increased by 15 cents to make a total of 70 cents?

Sight Drills

1. Add:

	A	*B*	*C*	*D*	*E*	*F*	*G*
a.	50	40	20	40	32	20	14
	+30	+50	+70	+20	+30	+42	+80
b.	60	61	43	54	63	47	58
	+24	+24	+22	+25	+36	+20	+31

2. Subtract:

a.	80	80	62	62	90	94	96
	−50	−30	−40	−22	−70	−60	−36
b.	84	95	84	95	76	67	59
	−53	−72	−31	−23	−30	−44	−29

3. Multiply:

a.	40	30	20	41	32	21	11
	×2	×3	×4	×2	×3	×4	×9
b.	12	13	14	22	23	24	33
	×4	×3	×2	×4	×3	×2	×3
c.	20	30	40	50	60	70	80
	×9	×8	×7	×6	×5	×4	×3

4. Divide:

a.	$\frac{80}{2}$	$\frac{80}{40}$	$\frac{60}{20}$	$\frac{60}{30}$	$\frac{60}{2}$	$\frac{60}{3}$	$\frac{60}{10}$
b.	$\frac{90}{30}$	$\frac{90}{3}$	$\frac{84}{42}$	$\frac{84}{21}$	$\frac{84}{4}$	$\frac{96}{3}$	$\frac{88}{4}$

Oral Problems

1. How many nickels are there in a half dollar?

SOLUTION

The number of nickels in 50 cents is the number of times 5 cents is contained in 50 cents, which is 10. *Ans.* 10 nickels.

2. How many quarts in 5 gallons?

SOLUTION

Since there are 4 quarts in 1 gallon, in 5 gallons there are 5 times 4 quarts, or 20 quarts. *Ans.* 20 quarts.

3. Change 4 feet to inches.

4. Change 32 pecks to bushels.

5. At 5 cents per pound, how many pounds of sugar can be bought for 45 cents?

6. If a train goes 45 miles in one hour, and 40 miles the next hour, how many miles does it go in two hours?

7. A girl is taking a 90-mile trip in an automobile. How many miles has she yet to go after having traveled 60 miles?

8. How many pounds of 5-cent sugar can be bought for a quarter dollar? A half dollar?

Written Problems

1. How many nickels are there in 85 cents?

SOLUTION

To find the number of 5-cent pieces in 85 cents, divide 85 cents by 5 cents, which gives 17. The answer is 17 nickels.

5 cents)85 cents
Ans. 17 (nickels)

2. How many quarts in 23 gallons?

SOLUTION

Since 1 gallon is equal to 4 quarts, 23 gallons are 23 times 4 quarts, or 92 quarts.

NOTE. Although 23 is written as the multiplier, the product is obtained by multiplying the larger number, 23, by the smaller number, 4.

4 qt.
× 23
Ans. 92 qt.

3. Change 7 feet to inches.

4. Change 96 pecks to bushels.

5. At 5 cents per pound, how many pounds can I buy for 95 cents?

6. If a boat sails 47 miles in the morning, and 45 miles in the afternoon, how far has it sailed?

7. A boy is taking a 90-mile trip. How many miles has he to go after he has gone 47 miles?

8. How many pounds of 5-cent sugar can be bought for a dollar and a quarter?

Multiplication Table

1	2	3	4	5	6	7	8	9
2	4	6	8	10	12	14	16	
3	6	9	12	15	18	21		
4	8	12	16	20	24			
5	10	15	20	25				
6	12	18	24					
7	14	21						
8	16							
9								

Copy the foregoing table, and fill the vacant spaces.

Write 2 times 9 in the second row and 9 times 2 in the second column, 3 times 8 and 3 times 9 in the third row, 8 times 3 and 9 times 3 in the third column, etc.

Oral Exercises

1. Count by 6's to 60.
2. Count by 7's to 70.
3. Count by 8's to 80.
4. Count by 9's to 90.
5. How many are (*a*) six 6's? (*b*) Seven 6's? (*c*) Eight 6's? (*d*) Nine 6's?
6. How many are (*a*) Seven 7's? (*b*) Eight 7's? (*c*) Nine 7's?
7. How many are (*a*) eight 8's? (*b*) Nine 8's?
8. How many are nine 9's?

Oral Problems

1. A farmer has 65 tons of hay. How many tons will he have after selling 43 tons?

2. I paid 84 cents for 4 pounds of coffee. What was the price per pound?

3. How many cars are there in two freight trains, one having 32 cars and the other having 30 cars?

4. What is the cost of 3 yards of ribbon at 32 cents per yard?

5. After giving away one half of his firecrackers, Tom has 42 left. How many did he have at first?

6. When tea is 60 cents a pound, what part of a pound can I buy for 30 cents?

7. What part of a girl's dollar is left after she spends 25 cents?

8. How many trees are there in 4 rows each containing 22 trees?

9. How many pints are there in 44 quarts? How many gallons?

10. How many feet in 48 inches?

11. A boy gave his sister 12 cents, which was one half of his money. How many cents had he left?

12. A man is 37 years old. In how many years will he be 40?

13. How many days are there in November and December?

14. How many days are there in 6 weeks?

Multiplying by 6

Drill Exercises

Give products:

6 × 6	7 × 6	8 × 6	9 × 6
6 × 7	7 × 5	8 × 5	9 × 5
6 × 8	7 × 4	8 × 4	9 × 4
6 × 9	7 × 3	8 × 3	9 × 3

1. Multiply:

	A	*B*	*C*	*D*	*E*
a.	666 × 6	777 × 6	888 × 6	999 × 6	666 × 7
b.	666 × 8	666 × 9	678 × 6	456 × 6	567 × 6
c.	345 × 6	789 × 6	456 × 8	345 × 8	234 × 9
d.	345 × 7	264 × 6	360 × 6	299 × 6	647 × 6

2. Multiply by 6:

	A	*B*	*C*	*D*	*E*
a.	344	1,448	1,454	1,583	1,628
b.	676	1,056	1,536	1,295	1,468
c.	458	1,374	1,665	1,378	1,357
d.	597	1,570	1,498	1,467	1,555

Dividing by 6

Drill Exercises

Give quotients:

	A	*B*	*C*	*D*	*E*
a.	6)36	6)42	8)32	7)42	6)30
b.	8)40	7)35	9)54	8)48	7)21
c.	9)36	6)48	8)24	7)14	8)16
d.	6)54	7)28	9)18	9)27	9)45
e.	5)45	6)24	5)30	4)24	5)20
f.	4)32	5)35	6)12	3)24	4)32

Written Exercises

1. If one tent shelters 6 soldiers, how many tents will be required to shelter 5,436 soldiers?

When the first quotient figure is written in its proper place, each remaining figure in the dividend must have a figure in the quotient.

6)5436 tents

Ans. 906 tents

DIVISION TEST

	6)6,120		6)4,806	6)6,024	
Quotient	1,020	*Ans.*	801 *Ans.*	1,004	*Ans.*
Divisor	× 6		× 6	× 6	
Dividend	6,120		4,806	6,024	

To test the result, cover the dividend with a piece of paper and write on the latter the product of the quotient by the divisor without rewriting the latter.

Written Exercises

Divide. Test answers:

	A	*B*	*C*	*D*
a.	6)1,056	6)1,572	6)2,286	6)2,160
b.	6)2,670	6)3,966	6)3,588	6)2,370
c.	6)4,068	6)4,416	6)5,244	6)5,658
d.	6)6,816	6)6,432	6)6,468	6)7,344
e.	6)7,740	6)8,670	6)8,832	6)8,634
f.	6)9,360	6)9,546	6)8,910	6)5,040
g.	6)2,358	6)3,456	6)4,560	6)6,780
h	6)7,890	6)8,910	6)9,870	6)8,766
i.	6)3,996	7)1,638	8)2,600	9)2,376
j.	6)4,662	7)2,345	8)1,800	9)4,995
k.	6)5,328	7)2,268	8)1,888	9)3,996

Remainders in Division

Sight Exercises

1. If I desire to divide 7 apples between 2 boys, how many whole apples can I give each? How can I divide the remaining apple between them? What is each part called?

2. What is the quotient of $7 \div 2$?

> When the dividend does not contain the divisor an exact number of times, write the remainder, then draw a line, and underneath write the divisor.
>
> $2\overline{)9}$ *Ans.* $4\frac{1}{2}$ $\quad$ $3\overline{)20}$ *Ans.* $6\frac{2}{3}$ $\quad$ $4\overline{)23}$ *Ans.* $5\frac{3}{4}$

	A	*B*	*C*
a.	$\frac{9}{4} = ?$	$\frac{17}{2} = ?$	$\frac{25}{3} = ?$
b.	$15 \div 2 = ?$	$19 \div 3 = ?$	$21 \div 4 = ?$

3. Give answers:

	A	*B*	*C*	*D*	*E*	*F*
a.	$3\overline{)22}$	$8\overline{)41}$	$6\overline{)37}$	$9\overline{)25}$	$5\overline{)51}$	$6\overline{)51}$
b.	$2\overline{)25}$	$3\overline{)38}$	$4\overline{)51}$	$8\overline{)25}$	$7\overline{)51}$	$6\overline{)25}$

	A	*B*	*C*	*D*
a.	$\frac{1}{2}$ of 9	$\frac{1}{3}$ of 10	$\frac{1}{4}$ of 13	$\frac{1}{4}$ of 31
b.	$\frac{1}{5}$ of 11	$\frac{1}{6}$ of 13	$\frac{1}{7}$ of 15	$\frac{1}{7}$ of 52
c.	$\frac{1}{8}$ of 25	$\frac{1}{9}$ of 19	$\frac{1}{6}$ of 37	$\frac{1}{5}$ of 52
d.	$\frac{1}{3}$ of 22	$\frac{1}{2}$ of 25	$\frac{1}{8}$ of 45	$\frac{1}{9}$ of 38

Oral Problems

1. How many hours are there in a day and a half?

2. A farmer had 80 acres of land. He sold 30 acres. How many acres were left?

3. If one man takes 60 days to do a piece of work, how long would it take 3 men to do it?

4. What is the cost of 40 newspapers at $\frac{1}{2}$ cent each?

5. There are 36 pupils in one room and 20 in another. How many are there in both rooms?

6. How many cars in 3 trains, each containing 20 cars?

7. How many weeks are there in 35 days?

8. A girl is 8 years old and her mother is 32 years old. What is the difference in their ages?

9. How many books are on two shelves one containing 16 books and the other containing 12 books?

10. How many ounces in a pound and a quarter?

11. How many minutes in 3 hours?

12. How many horses can be shod with 24 shoes?

13. If a rail is 10 yards long, how many feet long is it?

14. Two boys together weigh 150 pounds. If one weighs 80 pounds, what is the weight of the other?

15. How many months are there in three years?

16. How many inches in 2 feet?

Written Problems

1. How many hours are there in 4 days?

2. A farmer has 80 acres of land. How much land would he have if he sold 36 acres?

3. If one man takes 65 days to do a piece of work, how long would it take 5 men to do it?

4. Find the cost of 96 newspapers at $\frac{1}{2}$ cent each.

5. Mr. Jones has 36 pupils in his class and Mr. Brown has 38 pupils. How many in both classes?

6. How many cars in 4 trains each containing 24 cars?

7. How many weeks are there in 91 days?

8. A boy is 18 years old and his father is 46 years old. What is the difference in their ages?

9. There are 26 books on one shelf and 24 on another. How many books are there on both shelves?

10. How many ounces are there in 5 pounds?

11. How many minutes are there in 9 hours?

12. How many horses can be shod with 96 shoes?

13. If a fence is 16 yards long, how many feet long is it?

14. Two boys weigh together 150 pounds. If one weighs 83 pounds, what is the weight of the other?

15. How many months are there in 8 years?

16. How many inches in 5 feet?

Multiplying by 7

Drill Exercises

	A	*B*	*C*	*D*
a.	7 × 7	8 × 5	9 × 5	8 × 4
b.	7 × 8	8 × 6	9 × 6	7 × 5
c.	7 × 9	8 × 7	9 × 7	7 × 6

Written Exercises

1. Multiply:

	A	*B*	*C*	*D*
a.	777 × 7	888 × 7	999 × 7	777 × 8
b.	777 × 9	567 × 7	765 × 7	678 × 7
c.	876 × 7	789 × 7	987 × 7	897 × 7
d.	878 × 7	567 × 8	765 × 8	657 × 8
e.	657 × 9	576 × 8	576 × 9	756 × 8

2. Multiply by 7:

	A	*B*	*C*	*D*
a.	434	1,234	1,265	1,394
b.	766	1,067	1,347	1,406
c.	854	1,285	1,409	1,389

Dividing by 7

Written Exercises

1. Divide and test:

	A	*B*	*C*	*D*
a.	7)1,057	7)1,554	7)2,261	7)2,394
b.	7)2,660	7)2,156	7)3,493	7)2,835
c.	7)4,361	7)8,099	7)5,075	7)3,059
d.	7)6,048	7)4,263	7)2,569	7)9,982
e.	7)3,920	7)7,329	7)9,156	7)7,049
f.	7)2,583	7)7,098	7)9,212	7)4,760

2. Divide by 7. Test:

a.	9,842	8,953	9,569	8,638
b.	3,038	9,863	7,469	9,723
c.	8,932	6,699	5,978	8,995

Multiplication and Division

1. Multiply by 7:

	A	*B*	*C*	*D*
a.	957	1,380	1,368	1,278
b.	826	1,279	1,276	1,367

2. Divide by 7. Test:

a.	9,576	8,946	9,660	9,758
b.	5,782	5,362	8,855	9,429

Oral Problems

1. A man's farm is divided into 4 fields, each containing 8 acres. How many acres are there in the farm?

2. If 8 panes of glass are required for each window, how many windows will require 48 panes?

3. If a man works 8 hours a day, how many hours does he work in 10 days?

4. In an orchard of 80 trees all but 20 are peach trees. How many peach trees are there in the orchard?

5. How many players are needed in 2 games of football if each game requires 22 players?

6. A boy requires 12 days to do one fourth of a piece of work. How many days does he require to do the whole work?

1915 JANUARY 1915						
Sun.	Mon.	Tue.	Wed.	Thu.	Fri.	Sat.
					1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24/31	25	26	27	28	29	30

1915 FEBRUARY 1915						
Sun.	Mon.	Tue.	Wed.	Thu.	Fri.	Sat.
	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28						

7. How many days are there in January and February, 1915?

8. How many yards of wire are needed to make a fence 20 yards long, if the fence is 4 wires high?

9. How many chestnuts in 10 burs containing 2 nuts each and 10 containing 3 nuts each?

Written Problems

1. A man has a farm consisting of 7 fields, each containing 14 acres. How many acres are there in the farm?

2. If 8 panes of glass are required for each window, how many windows will require 96 panes?

3. If a farmer works 13 hours a day, how many hours does he work in 7 days?

4. In an orchard of 80 trees all but 28 are apple trees. How many are apple trees?

5. How many players are there in 4 games of baseball, if each game has 18 players?

6. A man requires 28 hours to do one third of a piece of work. How many hours does he require to do the whole work?

1916 FEBRUARY 1916						
Sun.	Mon.	Tue.	Wed.	Thu.	Fri.	Sat.
		1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29				

1916 MARCH 1916						
Sun.	Mon.	Tue.	Wed.	Thur.	Fri.	Sat.
			1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30	31	

7. How many days are there in February and March, 1916?

8. How many yards of wire are required to make a fence 27 yards long if the fence is 3 wires high?

9. How many chestnuts in 26 burs containing 2 chestnuts each and 13 containing 3 chestnuts each?

Multiplying by 8. By 9

Written Exercises

1. Find products:

	A	*B*	*C*	*D*
a.	888 × 8	999 × 8	888 × 9	987 × 8
b.	887 × 8	787 × 9	887 × 9	878 × 9
c.	678 × 8	789 × 8	897 × 8	678 × 9
d.	788 × 8	788 × 9	878 × 8	787 × 9
e.	999 × 9	989 × 9	899 × 9	998 × 9
f.	567 × 8	467 × 9	576 × 8	576 × 9

2. Multiply by 8:

	A	*B*	*C*	*D*
a.	1,056	1,167	1,234	963
b.	1,067	1,178	1,245	954
c.	1,088	1,189	1,225	947
d.	1,079	1,198	1,229	986
e.	1,097	1,187	1,239	927
f.	1,099	1,188	1,236	976

3. Multiply by 9:

	A	*B*	*C*	*D*
a.	1,023	1,078	1,099	929
b.	1,034	1,089	1,088	938
c.	1,045	1,093	1,077	947
d.	1,056	1,095	1,066	956
e.	1,067	1,097	1,055	965
f.	1,079	1,068	1,044	987
g.	1,084	1,072	1,033	976

Division by 8. By 9

Written Exercises

1. Divide by 8. Test:

	A	*B*	*C*	*D*
a.	8)3,752	8)8,520	8)9,984	8)8,352
b.	8)7,144	8)6,792	8)7,776	8)6,384
c.	8)8,368	8)8,744	8)8,464	8)9,856
d.	8)4,784	8)9,960	8)6,976	8)8,224
e.	8)9,160	8)5,536	8)8,952	8)8,600

2. Divide by 9. Test:

	A	*B*	*C*	*D*
a.	9)7,317	9)4,797	9)6,804	9)9,819
b.	9)8,235	9)6,669	9)8,487	9)9,450
c.	9)6,489	9)8,514	9)5,166	9)7,389
d.	9)6,507	9)6,957	9)8,262	9)5,517
e.	9)5,625	9)8,919	9)5,328	9)9,828

3. Find quotients:

	A	*B*	*C*	*D*
a.	5)9,375	7)8,008	9)9,405	6)7,602
b.	6)8,316	8)9,512	8)8,608	5)8,425
c.	7)9,009	9)8,838	7)6,006	7)5,005

Two Operations

Oral Problems

1. If 2 bats cost 20 cents, what will be the cost of 1 bat? What will be the cost of 7 bats?

2. If 3 pounds of sugar cost 18 cents, what will 5 pounds cost?

3. A man gives 6 cherries each to 8 children. How many does he give them? If he had 50 cherries at first, how many would be left?

4. Mrs. Smith has a dozen peaches. How many will she have if she gives 2 to each of her 3 children?

5. A girl buys a book for 15 cents and a writing pad for 6 cents. What is the cost of both? If she hands the storekeeper a 25-cent piece, how much change should she receive?

6. A row of corn contains 10 hills, 2 stalks to a hill. How many stalks are there? How many ears of corn are there if each stalk bears 2 ears?

7. John has 2 pockets, each containing 9 marbles. How many marbles has he? What did they cost at 6 for a cent?

8. At 6 for a cent what will be the cost of 3 bags of marbles each containing 8 marbles?

9. A man has 2 dozen oranges. How many will he have after selling 5 oranges?

10. A boy has 40 cents. How much would he have after spending 25 cents for a ball and 10 cents for a bat?

11. A boy set out 3 rows of cabbage, each containing 8 plants. How many plants did he set out? If he set out 6 plants in another row, how many plants did he set out all together?

12. A farmer planted 5 rows of beans, 10 hills to the row. How many hills did he plant? If he planted 14 hills in another row, how many hills did he plant in the 6 rows?

13. What is the cost of one half of a 20-cent pie? How much will the half pie cost and 25 cents' worth of sugar?

14. After buying $\frac{1}{2}$ pound of 40-cent tea, a girl gets 30 cents change. How much did she give the grocer?

15. How many pints of milk are there in two cans, one containing 20 quarts and the other containing 10 quarts?

16. A man had 20 quarts of berries. He used 12 quarts and sold the remainder for 5 cents per quart. What did he get for those he sold?

17. A lady gave a half dollar and 3 dimes for 2 yards of goods. What was the price per yard?

18. A girl rides 2 hours in a train going 40 miles per hour, and 3 hours in a stage going 3 miles per hour. How far does she go?

19. A boy is reading a book of 90 pages. He has read 40 pages. How long will it take him to complete the book if he reads 10 pages an hour?

Written Problems

1. If 2 bats cost 30 cents, what will be the cost of 1 bat? What will be the cost of 5 bats?

2. If 3 pounds of cheese cost 48 cents, what will 5 pounds cost?

3. A man gives 16 cherries apiece to 4 children. How many does he give them? If he had 75 cherries at first, how many would be left?

4. Mr. Smith has 90 postage stamps. How many will he have after giving a dozen to each of 6 boys?

5. What is the cost of a 35-cent book and a 16-cent pad? How much change does the storekeeper give out of 75 cents to a boy who buys these two articles?

6. A row of corn contains 16 hills, 2 stalks to a hill. How many stalks are there? How many ears of corn are there if each stalk bears 2 ears?

7. William has 3 boxes, each containing 25 marbles. How many marbles has he? What would they cost at 5 for a cent?

8. At 6 for a cent what would be the cost of 3 boxes of marbles, 32 marbles to a box?

9. A man has 6 dozen lemons. How many lemons has he? How many will he have after selling 25 lemons?

10. A girl has 80 cents. How much would she have after spending 33 cents for a doll and 26 cents for the doll's clothes?

11. A girl planted 3 rows of geraniums, 14 plants in a row. How many geraniums did she plant? If she planted 18 pansies also, how many flowers of both kinds did she plant?

12. Ida had 3 cards of buttons, each containing 24 buttons, and one card containing 18 buttons. How many buttons were there in the 4 cards?

13. Find the cost of $\frac{1}{2}$ pound of tea costing 70 cents per pound. Find the total cost of the tea and a pound of 25-cent coffee.

14. After buying $\frac{1}{4}$ pound of 60-cent tea a boy gets 35 cents in change. How much did he give the storekeeper?

15. How many quarts of milk are there in two cans, one containing 9 gallons and the other containing 7 gallons?

16. A girl gathered 40 quarts of berries. She preserved 34 quarts and sold the remainder for 16 cents per quart. What did she get for those she sold?

17. A lady gave 3 quarters and 3 nickels for 6 yards of muslin. What did the muslin cost per yard?

18. A boy rode 2 hours on a train going 38 miles per hour and 3 hours in a stage going 4 miles per hour. How far did he ride?

19. A girl is reading a book of 123 pages. She has read 68 pages. How long will it take her to complete the book if she reads eleven pages an hour?

Multiplying by 10

Sight Exercises

1. How many cents in 2 dimes? In 3 dimes? In 5 dimes? In 9 dimes? In 10 dimes?

2. How many are ten 2's? Ten 4's? Ten 6's?

> To multiply a number by 10 affix a cipher to the multiplicand.
>
> Thus $16 \times 10 = 160$; $25 \times 10 = 250$.

3. Give products:

	A	*B*	*C*	*D*
a.	17×10	10×18	105×10	10×121
b.	19×10	10×21	206×10	10×343
c.	23×10	10×32	307×10	10×565

Dividing by 10

> To divide by 10 a number ending in a cipher reject the final cipher in the dividend.
>
> Thus $170 \div 10 = 17$; $280 \div 10 = 28$.

1. Give quotients:

	A	*B*	*C*	*D*
a.	$180 \div 10$	$600 \div 10$	$180 \div 18$	$1{,}800 \div 10$
b.	$210 \div 10$	$790 \div 10$	$210 \div 21$	$1{,}950 \div 10$
c.	$350 \div 10$	$800 \div 10$	$340 \div 34$	$2{,}160 \div 10$

Multiplying by a Multiple of 10

A dealer bought 30 boxes of pens. Each box contained 144 pens. How many pens did he buy?

PROCESS

The product by 0 is 0. Write 0 under the 0. Place the right-hand figure of the product by 3 under the 3.

144 pens
× 30
Ans. 4,320 pens

Sight Exercises

Give products:

	A	*B*	*C*	*D*
a.	26 × 10	11 × 60	33 × 30	50 × 11
b.	43 × 20	11 × 70	22 × 40	20 × 44
c.	32 × 30	11 × 80	34 × 20	40 × 12
d.	21 × 40	11 × 90	31 × 30	30 × 13

Sight Problems

1. How many hours in 2 days? In 20 days?
2. How many inches in 3 feet? In 30 feet?
3. How many ounces in 10 pounds?
4. How many pens in 40 dozen?
5. Find the cost of 50 yards at 11 cents per yard.
6. How many minutes in 10 hours?
7. How many miles will a train go in 20 hours at the rate of 43 miles per hour?
8. At 14 bushels to the acre, how many bushels of wheat will 20 acres yield?

Written Exercises

Find products:

	A	*B*	*C*	*D*	*E*
a.	325	234	186	157	128
	× 30	× 40	× 50	× 60	× 70
b.	119	108	123	135	164
	× 80	× 90	× 80	× 70	× 60

Written Problems

1. Change (*a*) 40 days to hours; (*b*) 80 feet to inches; (*c*) 60 pounds to ounces.

2. Find the cost of 50 yards of dress goods at 28 cents per yard.

PROCESS

Write 28 cents, using the dollar mark and the decimal point. Place a decimal point in the product under the one in the multiplicand.

$ .28
× 50
$ 14.00 *Ans.*

3. How much will be paid for 27 pounds of butter at 30 cents a pound?

4. A dealer sold 30 yards of cloth at $2.75 per yard. What did he receive for it?

5. A man receives $3.50 per day. How much does he earn in February if he works 20 days?

6. What is the cost of 40 yards of carpet at $1.25 per yard?

7. At $3.75 a foot, what is the cost of an iron fence 70 feet long?

Dividing by a Multiple of 10

Sight Exercises

Give quotients:

	A	*B*	*C*	*D*
a.	10)260	50)550	30)960	20)860
b.	40)880	20)680	70)700	80)880
c.	30)930	40)840	20)880	90)990

Oral Exercises

1. How many times are (*a*) 2 tens contained in 8 tens? (*b*) 3 tens in 12 tens? (*c*) 4 tens in 88 tens? (*d*) 6 tens in 60 tens? (*e*) 2 tens in 88 tens?

2. What is the quotient (*a*) of 8 cents ÷ 2 cents? (*b*) Of 8 dimes ÷ 4 dimes? (*c*) Of 6 tens ÷ 3 tens?

Written Exercises

1. A baseball stand contained 4200 seats. They were arranged in 30 sections. How many seats were in a section?

PROCESS

3|0)420|0 seats
Ans. 140 seats

Cut off by a vertical line the final cipher in both the divisor and the dividend. The numbers remaining will be 3 (the new divisor) and 420 (the new dividend).

	A	*B*	*C*	*D*
a.	50)1,350	20)6,940	40)9,760	30)9,720
b.	60)9,660	20)9,760	90)9,720	80)9,760
c.	50)8,000	40)9,760	30)9,720	60)9,720

Inexact Division

1. Divide 9,810 by 80.

PROCESS

$8|0\overline{)981|0}$

$122\frac{50}{80}$ *Ans.*

When there is a remainder, write the complete remainder, including the cipher cut off, over the original divisor.

NOTE. While performing the division the pupil need only consider the divisor as 8 and the dividend as 981, instead of 8 tens and 981 tens; but, at this stage the 5 tens remaining should be written as 50 over the divisor 8 tens, written as 80.

a. $20\overline{)9{,}910}$ *b.* $40\overline{)9{,}910}$ *c.* $60\overline{)9{,}910}$

d. $30\overline{)9{,}910}$ *e.* $50\overline{)9{,}910}$ *f.* $70\overline{)9{,}910}$

2. Divide 9,911 by 70.

PROCESS

$7|0\overline{)991|1}$

$\frac{1}{70}$

Since the dividend does not end in a cipher, there must be a remainder. In this case write the 1 cut off over the 70. When the division is performed, write before the 1, the 4 tens remaining, making the remainder 41.

$7|0\overline{)991|1}$

$141\frac{41}{70}$ *Ans.*

a. $40\overline{)2{,}316}$ *b.* $70\overline{)5{,}864}$ *c.* $80\overline{)6{,}873}$

d. $50\overline{)3{,}742}$ *e.* $60\overline{)3{,}915}$ *f.* $90\overline{)7{,}777}$

g. $30\overline{)6{,}418}$ *h.* $50\overline{)7{,}218}$ *i.* $70\overline{)8{,}326}$

j. $20\overline{)5{,}437}$ *k.* $40\overline{)6{,}351}$ *l.* $60\overline{)4{,}987}$

Areas of Rectangles

Oral Exercises

1. How many postage stamps in a sheet 7 stamps long, 4 stamps wide?

2. How many square yards are there in a floor 10 yards long, 8 yards wide?

3. How many square feet in the surface of a board 16 feet long, $\frac{1}{2}$ foot wide?

4. How many boards $\frac{1}{2}$ foot wide will cover a floor 12 feet wide?

5. Find the area of a fence 20 feet long, 6 feet high.

6. How many square feet of cloth will be required to cover the top of a table 4 feet long, $2\frac{1}{2}$ feet wide?

7. The top of a paving brick is 8 inches long, 4 inches wide. How many square inches will it cover?

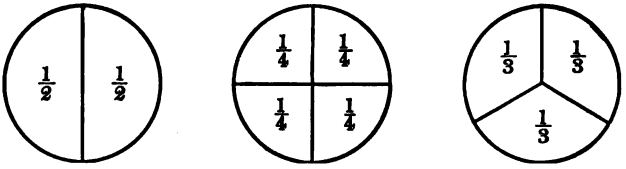
8. The side of a paving brick is 8 inches long, $2\frac{1}{2}$ inches high. How many square inches does it contain?

9. How many square inches are there in the end of a brick whose dimensions are 4 inches by $2\frac{1}{2}$ inches?

10. How many square yards are there in a playground 24 yards long, 20 yards wide?

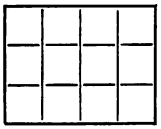
11. How many square yards of matting will cover a hall 10 yards long, $2\frac{1}{2}$ yards wide?

Fractional Parts



To divide a thing into halves, it is divided into *two* equal parts; to divide a thing into quarters, it is divided into *four* equal parts; to divide a thing into thirds, it is divided into *three* equal parts.

1. Draw a rectangle, 4 inches long and 3 inches wide. How many square inches does it contain?



2. How many square inches are there in each horizontal row of squares? In each vertical row?

3. What part of the whole rectangle is each vertical row of squares? What part are two vertical rows? Three vertical rows?

4. What part of the whole rectangle is one horizontal row of squares? Two horizontal rows?

> Three fourths is written $\frac{3}{4}$.
> Two thirds is written $\frac{2}{3}$.

5. One third of 12 squares is 4 squares; how many squares are 2 thirds of 12 squares? One fourth of 12 squares is 3 squares; how many squares are 3 fourths of 12 squares?

Oral Exercises

1. Give answers:

	A	*B*	*C*	*D*
a.	$\frac{1}{2}$ of 12	$\frac{1}{3}$ of 15	$\frac{2}{3}$ of 15	$\frac{1}{4}$ of 16
b.	$\frac{3}{4}$ of 16	$\frac{1}{5}$ of 15	$\frac{2}{5}$ of 15	$\frac{3}{5}$ of 15
c.	$\frac{4}{5}$ of 15	$\frac{1}{2}$ of 18	$\frac{1}{3}$ of 18	$\frac{2}{3}$ of 18
d.	$\frac{1}{4}$ of 16	$\frac{3}{4}$ of 16	$\frac{1}{5}$ of 20	$\frac{2}{5}$ of 20

2. How many inches (*a*) in $\frac{1}{2}$ foot? (*b*) $\frac{1}{4}$ foot? (*c*) $\frac{1}{3}$ foot? (*d*) $\frac{3}{4}$ foot? (*e*) $\frac{2}{3}$ foot?

3. How many ounces (*a*) in $\frac{1}{2}$ pound? (*b*) $\frac{1}{4}$ pound? (*c*) $\frac{3}{4}$ pound? (*d*) $\frac{5}{8}$ pound? (*e*) $\frac{7}{8}$ pound?

4. How many quarts (*a*) in $\frac{1}{2}$ peck? (*b*) $\frac{1}{4}$ peck? (*c*) $\frac{3}{4}$ peck?

5. What part of a foot is (*a*) 6 inches? (*b*) 4 inches? (*c*) 3 inches? (*d*) 9 inches? (*e*) 8 inches?

6. What part of a pound is (*a*) 8 ounces? (*b*) 4 ounces? (*c*) 12 ounces?

7. What part of a peck is (*a*) 2 quarts? (*b*) 4 quarts? (*c*) 6 quarts?

8. If a bushel of oats weighs 32 pounds, how many pounds does (*a*) a peck weigh? (*b*) A quart?

9. If a gallon of water weighs 8 pounds, what does (*a*) a pint weigh? (*b*) A quart?

10. How many pounds in $\frac{1}{2}$ bushel of potatoes if a bushel weighs 60 pounds?

11. If 2 pecks of wheat weigh 30 pounds, what is the weight of a bushel?

Denominate Numbers

Oral Exercises

1. How many hours (*a*) in a day and a half? (*b*) In 1 day 12 hours?

2. How many pints in a gallon?

3. How many quarts (*a*) in 3 gallons? (*b*) In 3 gallons 2 quarts?

4. How many quarts (*a*) in 2 pecks? (*b*) In 3 pecks? (*c*) In 4 pecks? (*d*) In a bushel?

5. How many eggs (*a*) in 3 dozen? (*b*) In 4 dozen?

6. How many days (*a*) in 7 weeks 1 day? (*b*) In 11 weeks?

7. How many weeks (*a*) in February, 1915? (*b*) How many weeks in January, and how many days over?

8. Change 4 feet 2 inches to inches.

9. Change 1 pound 6 ounces to ounces.

10. How many inches (*a*) in 2 feet? (*b*) In 3 feet? (*c*) In a yard?

11. How many minutes (*a*) in $\frac{1}{5}$ hour? (*b*) In $\frac{2}{5}$ hour?

12. What part of a day is (*a*) 6 hours? (*b*) 12 hours? (*c*) 18 hours?

13. Change 160 ounces to pounds.

14. Change 169 ounces to pounds and ounces.

15. Change 32 feet to yards and feet.

Written Exercises

1. How many hours (*a*) in $2\frac{1}{2}$ days? (*b*) In 2 days 12 hours?

2. (*a*) How many quarts in 13 gallons? (*b*) How many pints?

3. How many quarts (*a*) in 16 gallons? (*b*) In 16 gallons 2 quarts?

4. How many quarts (*a*) in 12 pecks? (*b*) In 3 bushels?

5. How many eggs (*a*) in 8 dozen? (*b*) In 7 dozen and a half?

6. How many days (*a*) in 14 weeks? (*b*) In 14 weeks 2 days?

7. (*a*) How many weeks in a year of 365 days, and how many days over? (*b*) How many days over in leap year, 366 days?

8. Change 8 feet 3 inches to inches.

9. Change 3 pounds 2 ounces to ounces.

10. How many inches (*a*) in 2 yards? (*b*) In $\frac{1}{2}$ yard? (*c*) In $2\frac{1}{2}$ yards?

11. How many minutes (*a*) in $\frac{1}{5}$ hour? (*b*) In $\frac{2}{5}$ hour? (*c*) In $\frac{3}{5}$ hour? (*d*) In $\frac{4}{5}$ hour?

12. What part of an hour is (*a*) 12 minutes? (*b*) 24 minutes? (*c*) 36 minutes? (*d*) 48 minutes?

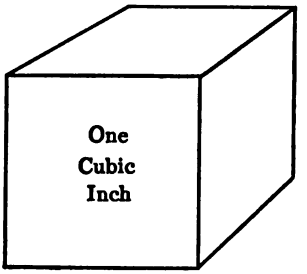
13. How many bushels in 64 pecks?

14. (*a*) How many gallons in 64 quarts? (*b*) How many pints?

Rectangular Solids

Oral Exercises

A cube each of whose edges measures 1 inch contains 1 cubic inch.



1. How many faces has a cube? How many edges? What is the length of each edge of a one-inch cube? How long is each face? How wide?

2. How many one-inch cubes will it take to make a cube 3 inches long, 3 inches wide, and 3 inches high? How many one-inch cubes in the bottom layer? In the top layer?

3. How many one-inch cubes will it take to cover the bottom of a box 4 inches long, 3 inches wide? If the box is 2 inches high, how many one-inch cubes will it take to fill the box?

4. How many cubes of loaf sugar will fill a box that will hold 6 layers, each layer containing 10 rows of 8 cubes each?

5. A pile of bricks is 10 bricks long. It contains 6 rows to a layer, and is 4 layers high. How many bricks are there in the pile?

SECTION III

Reading and Writing Numbers

Read the following:

Oral Exercises

	A	*B*	*C*	*D*	*E*
a.	10,000	50,590	10,008	23,406	35,600
b.	11,000	61,725	11,017	44,444	52,983
c.	20,000	70,354	22,034	53,007	72,500
d.	31,000	83,976	36,090	85,021	93,811
e.	54,000	92,417	40,003	11,642	64,300

Written Exercises

Write in figures:

1. Sixty-one thousand.
2. Fifty-three thousand seven hundred.
3. Forty thousand sixty.
4. Thirty-two thousand nine.
5. Twelve thousand three hundred forty-five.
6. Seventy thousand seven.
7. Eighty-eight thousand eight hundred eighty-eight.
8. Ninety-one thousand seven hundred twenty-seven.

Multipliers of Two Figures

1. Each of 467 pieces of copper wire weighs 21 ounces. What is their total weight?

PROCESS

Multiply by 1, placing the right-hand figure of the product under the 1. Multiply by 2 tens, placing the right-hand figure of the product under the 2. Combine the partial products.

467 oz.
× 21
467
934
Ans. 9,807 oz.

Written Exercises

2. Find products:

Test by performing the multiplication a second time without referring to the first operation until the product is again obtained.

	A	*B*	*C*	*D*
a.	444 × 22	184 × 53	132 × 75	121 × 82
b.	468 × 21	186 × 52	134 × 74	122 × 81
c.	222 × 33	195 × 51	137 × 73	101 × 99
d.	308 × 32	143 × 66	138 × 72	102 × 98
e.	316 × 31	151 × 65	139 × 71	103 × 97
f.	225 × 44	156 × 64	111 × 88	104 × 96
g.	231 × 43	158 × 63	112 × 87	105 × 95
h.	222 × 42	161 × 62	113 × 86	106 × 94
i.	237 × 41	163 × 61	116 × 85	107 × 93
j.	123 × 55	128 × 77	118 × 84	108 × 92
k.	172 × 54	131 × 76	119 × 83	109 × 91

Sight Drills

1. Multiply:

	A	*B*	*C*	*D*	*E*	*F*	*G*	*H*
a.	90	80	70	60	50	40	30	20
	×2	×3	×4	×5	×6	×7	×8	×9
b.	84	93	72	61	41	51	31	21
	×2	×3	×4	×5	×6	×7	×8	×9
c.	94	83	62	71	31	21	41	51
	×2	×3	×4	×5	×6	×7	×8	×9

2. Divide:

d.	180/20	240/30	360/40	350/50	360/60	280/70	320/80
e.	126/21	279/31	246/41	357/51	305/61	497/71	324/81
f.	630/90	819/91	243/81	568/71	183/61	255/51	164/41

3. Give quotients and remainders:

g.	190/21	248/41	186/61	248/81	369/91	357/71	460/51
h.	250/31	250/61	460/91	330/81	360/51	150/21	290/71
i.	100/99	200/99	300/99	400/99	400/98	400/97	400/96

Sight Problems

1. At 32 to a class, how many pupils are there in 4 classes?

2. At the rate of 21 miles per hour, how long would a trolley car require to go 147 miles?

3. Find the cost of 6 acres of land at $61 per acre.

4. How many suits of clothes at $21 each can be bought for $168?

5. What is the total weight of 6 tubs of butter if each weighs 51 pounds?

6. How many barrels will hold 369 gallons of oil if each holds 41 gallons?

7. How many yards around the 4 sides of a square each side of which measures 92 yards?

8. If a conductor receives $4.05 from 81 passengers, what does each pay?

9. At 51 nails to the pound, how many pounds will 459 nails weigh?

10. How many nails in 8 pounds if there are 61 nails to the pound?

11. A piece of rope 126 yards long is divided into 42 pieces. How many yards in each piece?

12. How many quarts of milk are there in 72 gallon-cans?

13. At 32 pounds to the bushel, how many bushels of oats will weigh 128 pounds?

14. How many 21-acre fields are there in a farm of 189 acres?

15. How far does a train travel in 4 hours at the rate of 42 miles per hour?

16. At 41 bushels to the acre, how many acres will produce 328 bushels of corn?

17. If a family uses 3 quarts of milk a day, how many quarts are used in July?

18. How many hours would a train require to go 128 miles at the rate of 32 miles per hour?

19. If 5 men require 41 hours to do a piece of work, how long would it take 1 man to do it?

20. What part of 276 is 92?

21. Find the cost of 72 2-cent postage stamps.

22. At 99 cents each, how many baseballs can be bought for $10, and how much change will there be?

23. If a hogshead contains 63 gallons, how many hogsheads are there in 189 gallons?

24. If 1 fourth of a number is 40, what is 3 fourths of the number?

120			?
$\frac{1}{4}$	$\frac{1}{4}$	$\frac{1}{4}$	$\frac{1}{4}$

25. If 3 fourths of a number is 120, what is 1 fourth of the number? What is the number?

26. What part of 120 is 40? What part of 120 is 30? What part of 120 is 90?

Long Division

1. A pile of copper wire pieces weighs 9,807 ounces. If each piece weighs 21 ounces, how many pieces in the pile?

PROCESS

Ans. 467 oz.

21)9807 oz.

84

140

126

147

147

Take 98 as the first partial dividend and divide it by 21. Write 4, the first quotient figure, above the 8. Multiply 21 by 4, and place the product 84 under 98. Subtract 84 from 98, and to the remainder 14 annex 0, the next figure of the dividend, which makes 140, the second partial dividend. Divide 140 by 21, and write the quotient 6 above the 0. Multiply 21 by 6 and place the product 126 under 140. Subtract 126 from 140, and to the remainder 14 annex 7, the remaining figure of the dividend, which makes 147 the next partial dividend. Divide 147 by 21 and write the quotient 7 above the 7. Multiply 21 by 7 and place the product 147 under 147. As this is the same as the last partial dividend, there is no remainder. The answer is, therefore, 467.

Ans. 286	*Ans.* 153	*Ans.* 137	*Ans.* 123
34)9724	53)8109	72)9864	81)9963
68	53	72	81
292	280	266	186
272	265	216	162
204	159	504	243
204	159	504	243

Write each figure in the quotient directly over the last figure of the partial dividend that produces it.

Testing Quotients

	Test			
Quotient	286	153	137	123
Divisor	× 34	× 53	× 72	× 81
	1144	459	274	123
	858	765	959	984
Dividend	9724	8109	9864	9963

2. Find quotients:

	A	*B*	*C*	*D*
a.	462 ÷ 21	714 ÷ 51	1,701 ÷ 81	3,936 ÷ 32
b.	483 ÷ 21	867 ÷ 51	2,592 ÷ 81	8,946 ÷ 42
c.	672 ÷ 21	612 ÷ 51	3,483 ÷ 81	9,828 ÷ 42
d.	693 ÷ 21	918 ÷ 51	4,374 ÷ 81	6,604 ÷ 52
e.	882 ÷ 21	816 ÷ 51	5,278 ÷ 91	1,820 ÷ 52
f.	651 ÷ 31	6,832 ÷ 61	1,092 ÷ 91	6,552 ÷ 52
g.	961 ÷ 31	1,403 ÷ 61	2,002 ÷ 91	1,352 ÷ 52
h.	682 ÷ 31	8,174 ÷ 61	1,183 ÷ 91	2,232 ÷ 62
i.	992 ÷ 31	2,745 ÷ 61	3,003 ÷ 91	1,550 ÷ 62
j.	713 ÷ 31	9,516 ÷ 61	4,004 ÷ 91	2,914 ÷ 62
k.	943 ÷ 41	7,881 ÷ 71	7,612 ÷ 22	1,944 ÷ 72
l.	533 ÷ 41	1,562 ÷ 71	3,476 ÷ 22	5,184 ÷ 72
m.	984 ÷ 41	9,514 ÷ 71	5,588 ÷ 22	1,476 ÷ 82
n.	902 ÷ 41	1,775 ÷ 71	4,352 ÷ 32	6,806 ÷ 82
o.	861 ÷ 41	9,656 ÷ 71	7,488 ÷ 32	6,900 ÷ 92
p.	561 ÷ 51	1,704 ÷ 71	7,104 ÷ 32	2,208 ÷ 92
q.	612 ÷ 51	9,372 ÷ 71	4,224 ÷ 32	4,416 ÷ 92

More than One Operation

Sight Problems

1. John has 12 marbles; James has 5 more than John. How many marbles have both?

2. If a girl saves 3 cents per day, how much less than a dollar does she save in October?

3. If a boy saves 2 cents per day, how much more than a half dollar does he save in October?

4. How many days in the first three months of 1916? (Leap year.)

5. How many days in April, May, and June?

6. From a 40-quart can of milk there have been sold 8 gallons. How many quarts remain?

7. What number divided by 21 gives a quotient of 4 and a remainder of 6?

8. A man has 39 cows in three fields. In one field he has 12 cows; in another field he has 14 cows. How many cows in the third field?

9. If a traveler's expenses are $3 per day, how much does he spend in three weeks?

10. Mary has as much more than 25 cents as Jane has less than 25 cents. If Mary has 32 cents, how much has Jane?

11. What must be added to 21 to obtain the difference between 15 and 58?

12. If 8 pounds of sugar cost 48 cents, how many pounds can be bought for 60 cents?

Written Problems

1. William has 25 marbles; Thomas has 16 more than William. How many marbles have both?

2. If a girl saves 3 cents a day, how much more than 50 cents does she save in February, 1916?

3. If a boy saves 4 cents a day in February, 1915, how much less than $ 2 does he save?

4. How many days in the first six months of 1914?

5. How many days in the last six months of 1915?

6. From a 41-gallon barrel of oil there have been sold 48 quarts. How many gallons remain?

7. What number divided by 21 gives a quotient of 3 and a remainder of 17?

8. A man has 60 cows in three fields. In one field he has 17 cows, in another he has 27 cows. How many has he in the third field?

9. If a traveler's expenses are $ 4 per day, how much does he spend in 7 weeks?

10. Sarah has as much more than 75 cents as Laura has less than 75 cents. If Laura has 58 cents, how much has Sarah?

11. What must be added to 39 to obtain the difference between 17 and 91?

12. If 3 pounds of coffee cost 72 cents, how many pounds can be bought for 96 cents?

13. When a 16 pound bag of sugar is worth 96 cents, what is the cost of 13 pounds?

Long Division

1. A machine turns out 8,649 feet of wire in 83 minutes. What is the output per minute? What is the production per minute when 9,499 feet are delivered in 73 minutes?

PROCESS

Ans. $104\frac{17}{83}$ ft.

83)8649 ft.
83
349
332
17

Place the first quotient figure over the right-hand figure of the first partial product, and a quotient figure over each of the remaining figures of the dividend, writing a cipher when a partial dividend does not contain the divisor.

Ans. $130\frac{9}{73}$ ft.

73)9499 ft.
73
219
219
9

TEST

104 *Quotient*
× 83 *Divisor*
312
832
8632
+ 17 *Remainder*
8649 *Dividend*

Test the result by adding the remainder to the product of the quotient by the divisor. The sum will equal the dividend if the work is correct.

130 *Quotient*
× 73 *Divisor*
390
910
9490
+ 9 *Remainder*
9499 *Dividend*

2. Divide:

a. 7,656 ÷ 25 *c.* 7,000 ÷ 66 *e.* 2,000 ÷ 19

b. 7,358 ÷ 35 *d.* 9,400 ÷ 77 *f.* 7,009 ÷ 28

Addition and Subtraction

Sight Drills

For daily drills a chart similar to the following may be prepared:

	A	*B*	*C*	*D*	*E*	*F*	*G*	*H*
a.	2	13	25	39	48	57	64	76
b.	3	15	29	38	47	54	66	72
c.	5	19	28	37	44	56	62	73
d.	9	18	27	34	46	52	63	75
e.	8	17	24	36	42	53	65	79
f.	7	14	26	32	43	55	69	78
g.	4	16	22	33	45	59	68	77
h.	6	12	23	35	49	58	67	74

1. Add to each of the numbers in the table:

A	*B*	*C*	*D*	*E*	*F*	*G*	*H*
50	41	32	23	14	25	36	47
60	51	42	33	24	35	46	57

To the order, "Add 50 by lines," successive pupils answer rapidly: 52, 63, 75, etc.; 53, 65, 79, etc. To the order, "Add 47 by columns," the replies are: 49, 50, 52, etc.; 60, 62, 66, etc.

2. Subtract each of the numbers in the table from

99	91	95	89	96	87	98	85
92	97	90	94	88	93	86	84

The order here is: "Take from 99 by lines" or "Take from 91 by columns."

Oral Exercises

NOTE. Combine with the entire first number the tens of the second number, then the ones.

Thus $86 + 53 = 86 + 50(136) + 3 = 139$.
Also $86 - 53 = 86 - 50(36) - 3 = 33$.

1. Add:

	A	*B*	*C*	*D*	*E*
a.	30 + 80	70 + 65	42 + 93	73 + 66	54 + 72
b.	40 + 90	85 + 90	71 + 65	81 + 98	65 + 33
c.	70 + 60	60 + 54	82 + 93	63 + 54	76 + 82
d.	80 + 90	37 + 80	63 + 53	35 + 82	82 + 21

2. Subtract:

e.	90 − 30	85 − 35	49 − 23	99 − 19	34 − 13
f.	80 − 40	74 − 40	68 − 34	86 − 21	55 − 22
g.	70 − 20	63 − 23	87 − 45	70 − 23	94 − 33
h.	60 − 30	72 − 30	56 − 22	66 − 23	86 − 25

3. Add:

	A	*B*	*C*	*D*
i.	40¢ + 70¢	50¢ + 85¢	31¢ + 63¢	44¢ + 63¢
j.	50¢ + 90¢	65¢ + 60¢	42¢ + 52¢	55¢ + 81¢
k.	60¢ + 60¢	70¢ + 35¢	53¢ + 46¢	66¢ + 40¢
l.	70¢ + 50¢	85¢ + 40¢	64¢ + 33¢	77¢ + 32¢

4. Subtract:

	A	*B*	*C*
m.	\$1.10 − \$ .30	\$1.05 − \$.50	94¢ − 32¢
n.	\$1.80 − \$1.50	\$1.06 − \$.86	87¢ − 63¢
o.	\$1.20 − \$ .70	\$1.07 − \$.70	75¢ − 21¢
p.	\$1.08 − \$1.60	\$1.08 − \$.48	69¢ − 46¢

Oral Problems

1. There are 35 boys and 30 girls in a school. How many pupils are there?

2. In a school of 86 pupils, 42 are girls. How many are boys?

3. When a boy saves 30 cents more, he will have a dollar. How much has he now?

4. A girl has read 35 pages in her reader and she has 60 more to read. How many pages are there in the book?

5. If I pay 5 hundred dollars for one lot and 4 hundred dollars for another, what do I pay for both?

6. Of a farm of 96 acres, 40 acres are in wheat and the rest in corn. How many acres are there in corn?

7. A conductor collected 47 fares going out, and coming back, 40 fares. How many did he collect on the round trip?

8. There are 42 telephone poles on one side of the road and 36 telegraph poles on the other side. How many poles are there on both sides?

9. A farmer has 42 cows. How many must he buy in order to have 65?

10. How many are 23 and 23?

11. A grocer mixed 40 pounds of black tea with 25 pounds of green tea. How many pounds of mixed tea were there?

Dollars and Cents

Written Exercises

1. Add. Test results:

	A	*B*	*C*	*D*	*E*
a.	$36.85	$ 7.44	$25.82	$31.25	$ 8.47
	6.95	8.82	5.33	9.45	20.00
	18.26	18.25	20.31	10.24	5.78
	5.37	4.76	2.59	7.13	.29
	7.44	37.53	.45	8.88	48.86
b.	$11.47	$35.79	$18.27	$ 5.10	$48.74
	10.83	3.46	3.42	43.83	.09
	45.09	11.89	20.35	7.65	6.85
	7.67	6.34	2.87	17.25	.77
	8.54	9.95	28.92	5.74	13.24
	.98	8.87	4.73	18.29	7.65
c.	$29.99	$12.25	$25.26	$10.79	$ 3.89
	14.89	8.24	8.43	3.04	22.50
	2.46	5.83	.24	13.40	6.18
	.25	16.79	53.10	7.44	20.06
	25.57	9.86	1.75	8.26	.88
	3.21	43.50	.89	.29	9.47
d.	$36.46	$9.32	$13.08	$12.46	$17.27
	5.16	8.56	3.15	13.81	6.66
	8.17	42.97	11.48	11.36	.75
	9.10	2.73	5.27	1.88	24.00
	29.13	9.37	5.21	.75	4.44
	6.48	10.66	40.69	29.95	.98

2. Subtract. Test:

	A	*B*	*C*	*D*	*E*
a.	\$90.00	\$87.50	\$75.98	\$56.03	\$47.96
	−8.47	−29.43	−47.99	−27.06	−8.89
b.	\$81.62	\$53.70	\$45.76	\$47.57	\$30.13
	−51.77	−9.84	−17.89	−30.75	−25.08
c.	\$36.80	\$52.23	\$93.28	\$85.64	\$92.73
	−19.95	−27.26	−47.65	−43.76	−50.95

3. Multiply. Test:

Point off two places in the answer for cents.

	A	*B*	*C*	*D*	*E*
a.	\$14.09	\$12.48	\$11.59	\$10.83	\$9.84
	×7	×8	×7	×9	×10
b.	\$7.65	\$6.45	\$8.90	\$4.32	\$3.25
	×10	×11	×21	×31	×41

4. Divide. Test:

Place the decimal point in the quotient when it is reached in the dividend.

	A	*B*	*C*	*D*
a.	4)\$98.76	5)\$95.75	6)\$96.84	7)\$90.09
b.	8)\$75.12	9)\$96.75	11)\$80.08	12)\$15.12
c.	21)\$60.06	21)\$90.09	21)\$48.93	21)\$68.88

Cents as Divisors

Written Exercises

1. At 5 cents per yard, how many yards can be bought for $1.95?

PROCESS	
Write the divisor and the dividend as *cents*.	cents cents
195 cents contains 5 cents 39 times.	5)195
Write yd. in a parenthesis.	*Ans.* 39 (yd.)

2. At 13 cents per pound, how many pounds of pork can be bought for $1.69?

(169 cents divided by 13 cents gives the *number* of pounds.)

3. Divide the following:

a. $3.64 ÷ $.07	*e.* $10.50 ÷ 25¢
b. $4.84 ÷ $.11	*f.* $10.50 ÷ 42¢
c. $4.84 ÷ $.44	*g.* $40.50 ÷ 50¢
d. $4.41 ÷ $.21	*h.* $17.22 ÷ 14¢

4. At 25 cents each, how many penknives can be bought for $12.75?

5. At 13 cents per quart, how many quarts of berries will $4.03 pay for?

6. At 30 cents per quart, how many quarts of ice cream can be bought for $10.80?

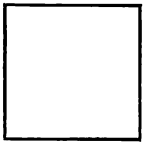
7. At 5 cents for each fare, how many fares amount to $3.45?

8. At 25 cents each, how many dolls can be bought for $6.25?

Rectangles

A *rectangle* is a figure of four sides having square corners.

The floor of the classroom is a rectangle; so is the ceiling, each wall, the door, the window.



The opposite sides of a rectangle are equal in length. When a rectangle has four equal sides, it is called a *square*.

To find the *area* of a rectangle means to find the number of square inches, square feet, square yards, etc., it contains.

Preparatory Exercises

1. A square having each side 1 foot long contains a *square foot*. How many 1-foot squares can be cut from a piece of paper 3 feet long, 2 feet wide?

2. A square having each side 1 yard long contains a *square yard*. How many 1-yard squares can be cut from a piece of sheeting 3 yards long, 2 yards wide?

To find the *number* of square inches, square feet, square yards, etc., in the area of a rectangle multiply the *number* of inches, feet, yards, etc., in its length by the *number* of the same denomination in its width.

Sight Exercises

1. Give the area of each of the following rectangles:

a. 10 in. by 11 in.
b. 14 ft. by 10 ft.
c. 20 yd. by 13 yd.
d. 16 in. by 10 in.
e. 9 ft. by 8 ft.
f. 10 yd. by 8 yd.
g. 20 in. by 12 in.
h. 21 ft. by 10 ft.
i. 12 yd. by 10 yd.
j. 11 in. by 9 in.

The *perimeter* of a figure is the distance around it.

2. The number of yards in the perimeter of a field 20 yards wide, 24 yards long is 20 yd. + 24 yd. + 20 yd. + 24 yd., or 88 yd.

3. Give the perimeter of each of the following rectangles:

a. 12 in. by 10 in.
b. 21 ft. by 21 ft.
c. 20 yd. by 14 yd.
d. 12 in. by 21 in.
e. 20 ft. by 30 ft.
f. 13 yd. by 30 yd.
g. 20 in. by 12 in.
h. 22 ft. by 22 ft.
i. 21 yd. by 13 yd.
j. 30 in. by 40 in.

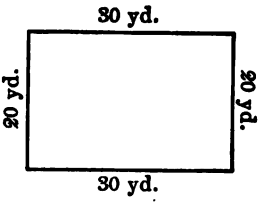
4. What is the length of a room 12 feet wide that contains 240 square feet?

5. Give the perimeter of a square whose area is 100 square inches.

6. How many square yards of carpet are needed to cover a floor 4 yards wide, 5 yards long?

Oral Problems

1. Find the perimeter of a field 30 yards long, 20 yards wide.



2. A rug contains 140 square feet. If its length is 14 feet, what is its width?

3. A field 30 yards long, 20 yards wide is inclosed by a wire fence. How many yards of wire are needed for each wire in the fence?

4. How many square inches of gilt paper are required to cover each of the six square faces of a cube 8 inches long?

5. A room is 20 feet long, 15 feet wide, 10 feet high.

a. How many square feet are there in each of the two side walls?

b. How many square feet are there in each of the two end walls?

c. How many square feet are there in the ceiling?

d. How many square feet of plastering are required?

e. How many square feet of carpet are needed to cover the floor?

6. How many square feet are there in a fence 6 feet high, 30 feet long?

Oral Problems

1. Find the cost of 4 pounds of tea at 40 cents a pound.

2. I paid $1.20 for 6 pineapples. What was the price of each?

3. Andrew has 90 cents; Bernard has 60 cents more than Andrew. How much has Bernard?

4. A $2 bill is given in payment for goods amounting to $1.20. How much change is received?

5. What is the cost of $\frac{1}{2}$ yard of silk at the rate of $1.60 a yard?

6. If a man receives $2.40 a day of 8 hours, how much is he paid an hour?

7. When goods cost $1.60 a yard, what part of a yard can be bought for 40 cents?

8. After spending 80 cents I have 80 cents left, how much had I at first?

9. Find the total cost of 25 cents' worth of cake and 3 pounds of candy at 20 cents per pound.

10. A girl pays 30 cents for 3 half-pound boxes of candy. What does the candy cost a pound?

11. If 2 feet of wire rope cost 20 cents, what would be the cost of a yard?

12. Find the cost of a yard of ribbon at the rate of 20 cents for two thirds of a yard.

13. A farmer has 80 sheep. How many has he after he sells three quarters of them?

Written Problems

1. Find the cost of 6 pounds of tea at 45 cents per pound.

2. I paid $1.05 for 7 quarts of berries. What was the price of a quart?

3. Harry has 84 cents; Fred has 26 cents more than Harry. How much money has Fred?

4. I buy goods amounting to $3.85 and I give the grocer a $5 bill. How much change do I get?

5. What is the cost of $\frac{1}{2}$ yard of velvet at $3.50 per yard?

6. If a man receives $2.80 per day of 8 hours, how much is he paid by the hour?

7. When goods cost $2.80 per yard, what part of a yard can be bought for 35 cents?

8. After giving his sister 55 cents, a boy still has $1.35. How much money had he at first?

9. What is the cost of 3 pounds of candy at 35 cents per pound and 45 cents' worth of ice cream?

10. A boy pays $1.05 for 3 half-pound packages of tea. What does the tea cost a pound?

11. If 2 feet of wire cable cost 38 cents, what is the cost of a yard?

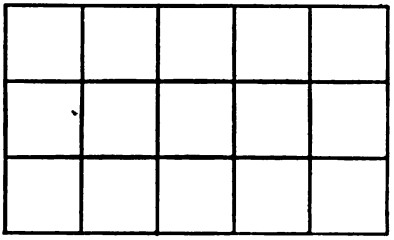
12. Find the cost of a yard of silk at the rate of 72 cents for two thirds of a yard.

13. A farmer has 144 sheep. How many would he have if he sold three fourths of them?

Fractional Parts

Oral Exercises

1. Draw a rectangle 5 inches long and 3 inches wide, and divide it into 1-inch squares.



2. (*a*) How many squares are there in each horizontal row? (*b*) How many horizontal rows are there? (*c*) How many square inches in the rectangle?

3. (*a*) How many squares are there in each vertical column? (*b*) How many vertical columns are there? (*c*) How many square inches are 5 times 3 square inches? (*d*) How many square inches are 3 times 5 square inches?

4. (*a*) What part of the rectangle is one horizontal row? (*b*) Two horizontal rows?

5. (*a*) What part of the rectangle is one vertical column? (*b*) Two vertical columns? (*c*) Three vertical columns? (*d*) Four vertical columns?

6. (*a*) 3 is what part of 15? (*b*) 5 is what part? (*c*) 6 is what part? (*d*) 9 is what part? (*e*) 10 is what part? (*f*) 12 is what part?

7. *a*. $\frac{1}{3}$ of 36, 60, 66, 90.
   b. $\frac{1}{4}$ of 24, 36, 80, 48.
   c. $\frac{2}{3}$ of 12, 18, 24, 30.
   d. $\frac{3}{4}$ of 16, 20, 32, 40.
   e. $\frac{1}{5}$ of 15, 25, 35, 45.
   f. $\frac{2}{5}$ of 5, 15, 25, 35.
   g. $\frac{3}{5}$ of 20, 30, 40, 50.
   h. $\frac{4}{5}$ of 15, 20, 35, 40.

Written Exercises

	A	*B*	*C*	*D*	*E*	*F*
1. Find $\frac{1}{2}$ of	276,	480,	178,	360,	696,	720.
2. Find $\frac{1}{3}$ of	360,	297,	165,	576,	480,	720.
3. Find $\frac{1}{4}$ of	484,	360,	576,	720,	244,	676.
4. Find $\frac{1}{5}$ of	510,	650,	360,	720,	480,	975.
5. Find $\frac{1}{6}$ of	270,	444,	720,	516,	888,	978.

Find $\frac{2}{3}$ of 408.

METHOD

$\frac{2}{\cancel{3}}$ of $\overset{136}{\cancel{408}} = 272$, *Ans.* Find 1 third of 408, which is 136, by dividing 408 by 3, and cancel these two numbers. Multiply 136 by 2.

6. Find $\frac{2}{3}$ of 342,	444,	396,	165,	576,	720.
7. Find $\frac{3}{4}$ of 480,	360,	576,	720,	244,	676.
8. Find $\frac{2}{5}$ of 510,	650,	360,	720,	480,	975.
9. Find $\frac{3}{5}$ of 510,	650,	360,	720,	480,	975.
10. Find $\frac{4}{5}$ of 510,	650,	360,	720,	480,	975.
11. Find $\frac{5}{6}$ of 360,	480,	720,	516,	888,	978.

12. (*a*) Find $\frac{2}{6}$ of 216. (*b*) Find $\frac{1}{3}$ of 216. (*c*) Compare the two results.

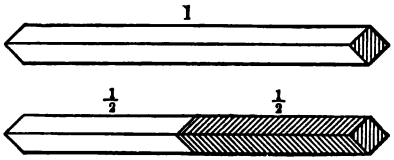
13. (*a*) Find $\frac{3}{6}$ of 216. (*b*) Find $\frac{1}{2}$ of 216. (*c*) Compare the results. (*d*) Find $\frac{5}{6}$ of 216.

14. (*a*) Find $\frac{4}{6}$ of 216. (*b*) Find $\frac{2}{3}$ of 216. (*c*) Compare the results.

15. Find the sum of $\frac{1}{6}$ of 216 and $\frac{1}{3}$ of 216.

Mixed Numbers Containing Halves

Preliminary Exercises



1. I buy one half dollar's worth of tea and one half dollar's worth of sugar. What do I pay for both?

2. How many half dollars (*a*) in \$1? (*b*) In \$2? (*c*) In \$$1\frac{1}{2}$? (*d*) In \$$2\frac{1}{2}$?

$1\frac{1}{2}$, $2\frac{1}{2}$, etc., are called *mixed numbers*.

3. Change to a whole number or to a mixed number: (*a*) $\frac{2}{2}$. (*b*) $\frac{3}{2}$. (*c*) $\frac{4}{2}$. (*d*) $\frac{5}{2}$.

4. A man sold a pie and a half to a boy, and a half pie to a girl. How many did he sell to both?

5. A girl baked 3 pies. How many of them are left after $\frac{1}{2}$ pie is eaten?

6. A man earned \$3 per day. He spent \$$2\frac{1}{2}$ per day. How much did he save each day?

7. Give sums at sight:

a.	*b.*	*c.*	*d.*	*e.*
$3\frac{1}{2}$	$3\frac{1}{2}$	$3\frac{1}{2}$	$3\frac{1}{2}$	$3\frac{1}{2}$
$+3\frac{1}{2}$	$+2\frac{1}{2}$	$+1\frac{1}{2}$	$+3$	$+\frac{1}{2}$

8. Give remainders at sight:

a.	*b.*	*c.*	*d.*	*e.*
$6\frac{1}{2}$	6	$6\frac{1}{2}$	6	6
$-3\frac{1}{2}$	$-\frac{1}{2}$	-4	$-1\frac{1}{2}$	$-4\frac{1}{2}$

Written Exercises

1. Three lots of cloth contained $13\frac{1}{2}$, $6\frac{1}{2}$, and $29\frac{1}{2}$ yards. How many yards in all?

PROCESS

First add the fractions. Their sum is $\frac{3}{2}$, which is equal to $1\frac{1}{2}$. Write the fraction $\frac{1}{2}$, and carry 1 to the column of ones, etc.

$13\frac{1}{2}$ yd.
$6\frac{1}{2}$
$29\frac{1}{2}$
Ans. $49\frac{1}{2}$ yd.

2. Add the following:

	A	*B*	*C*	*D*	*E*
a.	$20\frac{1}{2}$	$20\frac{1}{2}$	$37\frac{1}{2}$	25	$25\frac{1}{2}$
	37	$37\frac{1}{2}$	$6\frac{1}{2}$	$30\frac{1}{2}$	$30\frac{1}{2}$
b.	$48\frac{1}{2}$	$18\frac{1}{2}$	$37\frac{1}{2}$	$23\frac{1}{2}$	17
	$37\frac{1}{2}$	$14\frac{1}{2}$	$56\frac{1}{2}$	$15\frac{1}{2}$	$18\frac{1}{2}$
c.	$63\frac{1}{2}$	$55\frac{1}{2}$	27	1	23
	$8\frac{1}{2}$	20	$6\frac{1}{2}$	$17\frac{1}{2}$	$9\frac{1}{2}$
	$9\frac{1}{2}$	$17\frac{1}{2}$	48	$8\frac{1}{2}$	64
d.	20	$37\frac{1}{2}$	$3\frac{1}{2}$	$25\frac{1}{2}$	17
	$36\frac{1}{2}$	$20\frac{1}{2}$	18	$26\frac{1}{2}$	$6\frac{1}{2}$
	$6\frac{1}{2}$	30	50	27	18
	9	$1\frac{1}{2}$	$4\frac{1}{2}$	10	$25\frac{1}{2}$
e.	$21\frac{1}{2}$	$15\frac{1}{2}$	$18\frac{1}{2}$	$30\frac{1}{2}$	$20\frac{1}{2}$
	$21\frac{1}{2}$	$15\frac{1}{2}$	$18\frac{1}{2}$	$20\frac{1}{2}$	$20\frac{1}{2}$
	$21\frac{1}{2}$	$15\frac{1}{2}$	$18\frac{1}{2}$	$10\frac{1}{2}$	$20\frac{1}{2}$
	$21\frac{1}{2}$	$15\frac{1}{2}$	$18\frac{1}{2}$	$5\frac{1}{2}$	$20\frac{1}{2}$

Subtraction

3. Find answers:

	A	*B*	*C*	*D*	*E*
a.	$4\frac{1}{2}$	41	$41\frac{1}{2}$	$31\frac{1}{2}$	$20\frac{1}{2}$
	$+\,?$	$+\,?$	$+\,?$	$+\,?$	$+\,?$
	$50\frac{1}{2}$	$50\frac{1}{2}$	50	50	50
b.	?	?	?	?	?
	$+36$	$+36\frac{1}{2}$	$+36\frac{1}{2}$	$+30\frac{1}{2}$	$+19\frac{1}{2}$
	$50\frac{1}{2}$	$50\frac{1}{2}$	50	50	50

4. Subtract $19\frac{1}{2}$ from 100.

PROCESS

Say $\frac{1}{2}$ and $\frac{1}{2}$ (writing $\frac{1}{2}$) are 1. Carrying 1 to 9, say 10 and **0** (writing 0) are 10. Carrying 1 to 1, say 2 and **8** (writing 8) are 10. Test by adding $80\frac{1}{2}$ and $19\frac{1}{2}$.

$$\begin{array}{r} 100 \\ -\ 19\frac{1}{2} \\ \hline 80\frac{1}{2} \end{array}$$

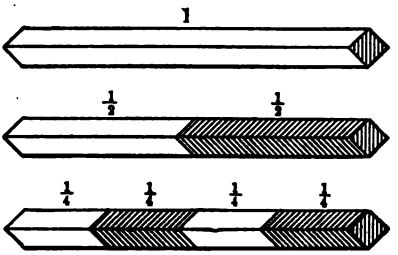
Ans.

5. Subtract:

	A	*B*	*C*	*D*	*E*
a.	80	$75\frac{1}{2}$	$93\frac{1}{2}$	62	$48\frac{1}{2}$
	$-19\frac{1}{2}$	$-48\frac{1}{2}$	-57	$-13\frac{1}{2}$	-29
b.	$50\frac{1}{2}$	$47\frac{1}{2}$	$31\frac{1}{2}$	$44\frac{1}{2}$	63
	$-28\frac{1}{2}$	-19	$-17\frac{1}{2}$	$-16\frac{1}{2}$	$-14\frac{1}{2}$
c.	$51\frac{1}{2}$	62	$73\frac{1}{2}$	$84\frac{1}{2}$	$72\frac{1}{2}$
	-22	$-19\frac{1}{2}$	$-25\frac{1}{2}$	-46	$-26\frac{1}{2}$
d.	95	$86\frac{1}{2}$	$77\frac{1}{2}$	68	$50\frac{1}{2}$
	$-59\frac{1}{2}$	$-38\frac{1}{2}$	-49	$-19\frac{1}{2}$	-23

Halves and Fourths

Preparatory Exercises



1. How many quarters in 1 quarter and 1 quarter?

2. What single piece of money has the same value as 2 quarter dollars?

3. What fraction has the same value as $\frac{2}{4}$?

NOTE. When $\frac{2}{4}$ is changed to $\frac{1}{2}$, it is expressed in *lowest terms*.

4. How many fourths are 3 fourths and 1 fourth?

5. Give the sum of $\frac{3}{4}+\frac{1}{4}$ as a whole number.

Improper Fractions. Mixed Numbers

$\frac{1}{2}$, $\frac{2}{3}$, $\frac{3}{4}$, $\frac{2}{5}$, are called *proper fractions*, since each is less than 1.

$\frac{2}{2}$, $\frac{4}{3}$, $\frac{6}{4}$, $\frac{10}{5}$, are called *improper fractions*, since each is 1 or more.

$2\frac{1}{2}$, $3\frac{1}{4}$, $7\frac{2}{3}$, are called *mixed numbers*, since each consists of a whole number and a fraction.

6. Change each of the following improper fractions to a whole number or to a mixed number:

a. $\frac{2}{2}$.	*b*. $\frac{3}{2}$.	*c*. $\frac{4}{4}$.	*d*. $\frac{5}{4}$.
e. $\frac{4}{2}$.	*f*. $\frac{9}{4}$.	*g*. $\frac{8}{4}$.	*h*. $\frac{5}{2}$.

7. How many dollars are (*a*) 4 quarter-dollars? (*b*) 4 half-dollars? (*c*) 6 half-dollars?

Addition

8. Find the sum (*a*) of $38\frac{1}{4}$ and $27\frac{1}{4}$. (*b*) Of $38\frac{1}{4}$ and $27\frac{1}{2}$. (*c*) Of $38\frac{3}{4}$ and $27\frac{1}{2}$. (*d*) Of $38\frac{3}{4}$ and $27\frac{3}{4}$.

a.	*b.*	*c.*	*d.*
$38\frac{1}{4}$	$38\frac{1}{4}$	$38\frac{3}{4}$	$38\frac{3}{4}$
$+\ 27\frac{1}{4}$	$+27\frac{1}{2}$	$+27\frac{1}{2}$	$+27\frac{3}{4}$
Ans. $65\frac{1}{2}$	*Ans.* $65\frac{3}{4}$	*Ans.* $66\frac{1}{4}$	*Ans.* $66\frac{1}{2}$

In (*a*) the sum of the fractions is $\frac{2}{4}$. Change $\frac{2}{4}$ to $\frac{1}{2}$ and write $\frac{1}{2}$ under the fractions. Add the whole numbers.

In (*b*) change $\frac{1}{2}$ to $\frac{2}{4}$ and add to $\frac{1}{4}$. Write the sum, $\frac{3}{4}$, under the fractions; etc.

In (*c*) change $\frac{1}{2}$ to $\frac{2}{4}$ and add to $\frac{3}{4}$, making $\frac{5}{4}$, which is equal to $1\frac{1}{4}$. Write $\frac{1}{4}$ under the fractions and carry 1 to the whole numbers.

In (*d*) change the sum of the fractions $\frac{6}{4}$ to $1\frac{2}{4}$, which is equal to $1\frac{1}{2}$. Write $\frac{1}{2}$ under the fractions and carry 1 to the whole numbers.

Sight Exercises

NOTE. Change $\frac{2}{4}$ in a result to $\frac{1}{2}$.

Give sums:

	A	*B*	*C*	*D*	*E*
a.	$3\frac{1}{4}$	$3\frac{1}{4}$	$4\frac{3}{4}$	$1\frac{3}{4}$	$3\frac{1}{4}$
	$+3\frac{1}{4}$	$+3\frac{3}{4}$	$+5\frac{1}{4}$	$+1\frac{3}{4}$	$+6\frac{3}{4}$
b.	$1\frac{1}{4}$	$2\frac{1}{4}$	$2\frac{1}{2}$	$3\frac{1}{4}$	$3\frac{1}{4}$
	$1\frac{1}{4}$	$3\frac{3}{4}$	$2\frac{1}{4}$	2	$3\frac{1}{4}$
	$1\frac{1}{4}$	4	$2\frac{1}{4}$	$1\frac{3}{4}$	$3\frac{1}{2}$

Written Exercises

Add the following:

	A	*B*	*C*	*D*	*E*
a.	$13\frac{1}{4}$	$6\frac{1}{4}$	$20\frac{3}{4}$	$7\frac{1}{4}$	$17\frac{1}{4}$
	$3\frac{3}{4}$	$16\frac{1}{4}$	$8\frac{1}{4}$	29	$9\frac{1}{4}$
	25	$26\frac{1}{4}$	$9\frac{1}{4}$	$50\frac{1}{4}$	$23\frac{1}{4}$
b.	$53\frac{3}{4}$	$53\frac{3}{4}$	$25\frac{1}{2}$	$48\frac{3}{4}$	$48\frac{3}{4}$
	$27\frac{1}{4}$	$27\frac{1}{2}$	$65\frac{1}{4}$	$29\frac{1}{4}$	$29\frac{1}{2}$

Sight Exercises

Give answers:

	A	*B*	*C*	*D*	*E*
a.	$16\frac{1}{2}$	$24\frac{3}{4}$	$33\frac{3}{4}$	$47\frac{1}{4}$	$50\frac{1}{2}$
	$-1\frac{1}{4}$	$-2\frac{1}{2}$	$-3\frac{1}{4}$	$-4\frac{1}{4}$	$-5\frac{1}{4}$
b.	$29\frac{1}{2}$	$38\frac{3}{4}$	$42\frac{3}{4}$	35	46
	$-1\frac{1}{4}$	$-2\frac{1}{2}$	$-1\frac{1}{4}$	$-\frac{1}{4}$	$-\frac{1}{2}$
c.	28	36	47	$55\frac{1}{2}$	$63\frac{1}{2}$
	$-1\frac{1}{4}$	$-2\frac{1}{2}$	$-1\frac{3}{4}$	$-6\frac{1}{4}$	$-7\frac{1}{4}$

Written Exercises

Subtract:

	A	*B*	*C*	*D*	*E*
a.	$38\frac{3}{4}$	$62\frac{3}{4}$	$95\frac{3}{4}$	$65\frac{3}{4}$	46
	$-19\frac{1}{4}$	$-33\frac{1}{4}$	$-27\frac{3}{4}$	$-16\frac{1}{4}$	$-17\frac{1}{4}$
b.	73	84	50	$57\frac{3}{4}$	$81\frac{1}{2}$
	$-25\frac{1}{2}$	$-36\frac{1}{4}$	$-29\frac{3}{4}$	$-28\frac{1}{4}$	$-16\frac{1}{4}$

Oral Problems

1. If I buy goods amounting to $\$1\frac{1}{2}$, how much change should I get out of a $\$10$ bill?

2. A grocer sold $1\frac{1}{2}$ pounds of black tea and $\frac{3}{4}$ pound of green tea. How many pounds did he sell of both?

3. At $\$1\frac{1}{4}$ each, what is the cost of 3 baseball gloves?

4. If I have 6 yards of calico and I use three fourths of a yard, how much have I left?

5. A baker has $3\frac{1}{2}$ apple pies and $4\frac{1}{4}$ peach pies. How many has he of both kinds?

6. One cow gave $15\frac{1}{2}$ quarts of milk and another gave $16\frac{1}{2}$ quarts. How many quarts did both cows give?

Written Problems

1. If I buy goods amounting to $\$19\frac{1}{4}$, how much change should I receive out of a $\$50$ bill?

2. A grocer sold in a day $24\frac{1}{2}$ pounds of black tea and $18\frac{3}{4}$ pounds of green tea. How many pounds did he sell of both?

3. At $\$17\frac{1}{4}$ each, what is the cost of 4 tables?

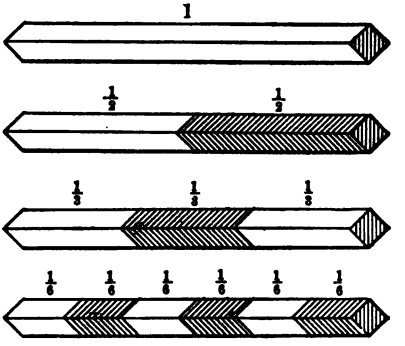
4. If I have 60 yards of muslin, how many yards shall I have after using $13\frac{3}{4}$ yards?

5. A dealer has $23\frac{1}{2}$ apple pies, $14\frac{1}{4}$ peach pies, and $3\frac{1}{4}$ plum pies. How many pies has he?

Thirds and Sixths

Preparatory Exercises

1. How many halves in 1? How many thirds in 1? How many sixths in 1?



2. How many sixths in one half? How many sixths in one third? How many sixths in two thirds?

3. How many sixths in 1 sixth + 1 sixth? How many thirds?

4. How many sixths in 1 sixth + 1 third? Give the sum of $\frac{1}{6}+\frac{1}{3}$ in lowest terms.

5. How many sixths in 1 sixth + 1 half? Give the sum of $\frac{1}{6}+\frac{1}{2}$ in lowest terms.

Sight Exercises

Give sums. Change $\frac{2}{6}$ in a result to $\frac{1}{3}$, $\frac{3}{6}$ to $\frac{1}{2}$, $\frac{4}{6}$ to $\frac{2}{3}$.

	A	*B*	*C*	*D*	*E*	*F*
a.	$1\frac{1}{3}$	$2\frac{1}{6}$	$3\frac{1}{6}$	$4\frac{2}{6}$	$5\frac{1}{3}$	$6\frac{3}{6}$
	$1\frac{1}{3}$	$2\frac{1}{6}$	$3\frac{5}{6}$	$4\frac{1}{6}$	$5\frac{1}{6}$	$6\frac{1}{6}$
b.	$7\frac{1}{2}$	$8\frac{4}{6}$	$9\frac{2}{3}$	$8\frac{2}{3}$	$7\frac{2}{3}$	$6\frac{2}{3}$
	$7\frac{1}{6}$	$8\frac{1}{6}$	$9\frac{1}{6}$	$8\frac{2}{3}$	$7\frac{1}{3}$	$6\frac{5}{6}$

Written Exercises

Add:

	A	*B*	*C*	*D*
a.	$28\frac{1}{3}$	$28\frac{2}{3}$	$28\frac{1}{6}$	$28\frac{1}{6}$
	$8\frac{1}{3}$	$8\frac{2}{3}$	$8\frac{1}{6}$	8
	$19\frac{1}{3}$	$19\frac{2}{3}$	$19\frac{1}{6}$	$19\frac{1}{6}$
b.	$27\frac{1}{3}$	$38\frac{1}{3}$	4	$39\frac{5}{6}$
	32	$7\frac{1}{6}$	$66\frac{1}{2}$	50
	$5\frac{1}{3}$	43	$25\frac{1}{6}$	$4\frac{1}{6}$
c.	$16\frac{1}{3}$	$33\frac{1}{6}$	$11\frac{1}{6}$	$62\frac{2}{3}$
	$22\frac{2}{3}$	$8\frac{5}{6}$	38	$35\frac{1}{6}$
	39	$14\frac{1}{6}$	$46\frac{2}{3}$	$1\frac{1}{6}$
d.	$45\frac{1}{2}$	$24\frac{1}{6}$	$57\frac{1}{3}$	$14\frac{5}{6}$
	$18\frac{1}{3}$	$58\frac{1}{6}$	$15\frac{1}{3}$	95
	$24\frac{1}{6}$	$7\frac{1}{6}$	$18\frac{1}{3}$	49
e.	$47\frac{5}{6}$	26	$36\frac{5}{6}$	$46\frac{2}{3}$
	37	$7\frac{2}{3}$	$5\frac{5}{6}$	$15\frac{2}{3}$
	$8\frac{1}{3}$	$59\frac{5}{6}$	$28\frac{5}{6}$	$8\frac{2}{3}$
f.	$29\frac{1}{6}$	$8\frac{1}{6}$	$65\frac{1}{6}$	43
	$35\frac{1}{6}$	$68\frac{1}{3}$	17	$38\frac{1}{3}$
	$14\frac{1}{6}$	$9\frac{1}{2}$	$3\frac{2}{3}$	$5\frac{1}{6}$
g.	$34\frac{5}{6}$	28	$64\frac{1}{2}$	$28\frac{1}{6}$
	$24\frac{5}{6}$	$41\frac{2}{3}$	$5\frac{1}{3}$	$8\frac{1}{6}$
	34	$19\frac{2}{3}$	$25\frac{1}{6}$	48

Sight Exercises

Subtract:

	A	*B*	*C*	*D*	*E*	*F*
a.	2	2	$3\frac{1}{3}$	$3\frac{1}{3}$	$4\frac{1}{2}$	6
	$1\frac{1}{3}$	$1\frac{1}{6}$	$1\frac{1}{6}$	$3\frac{1}{6}$	$4\frac{1}{6}$	$5\frac{2}{3}$
b.	$7\frac{5}{6}$	$8\frac{5}{6}$	$9\frac{5}{6}$	$8\frac{5}{6}$	8	$6\frac{1}{2}$
	$1\frac{1}{6}$	$1\frac{1}{3}$	$1\frac{1}{2}$	$1\frac{2}{3}$	$6\frac{5}{6}$	$5\frac{1}{3}$

Written Exercises

Subtract:

	A	*B*	*C*	*D*
a.	75	94	87	93
	$13\frac{1}{3}$	$26\frac{2}{3}$	$48\frac{1}{6}$	$57\frac{5}{6}$
b.	$46\frac{2}{3}$	$32\frac{2}{3}$	$67\frac{5}{6}$	$54\frac{5}{6}$
	$19\frac{1}{3}$	$18\frac{1}{6}$	$29\frac{1}{3}$	$16\frac{2}{3}$
c.	$70\frac{1}{2}$	$41\frac{2}{3}$	$82\frac{5}{6}$	$90\frac{1}{2}$
	$43\frac{1}{3}$	$27\frac{1}{2}$	$16\frac{1}{2}$	$37\frac{1}{6}$
d.	$33\frac{5}{6}$	$52\frac{1}{2}$	$68\frac{1}{3}$	$41\frac{2}{3}$
	$16\frac{1}{6}$	$38\frac{1}{6}$	$29\frac{1}{6}$	$17\frac{1}{6}$
e.	53	65	70	82
	$26\frac{1}{6}$	$37\frac{5}{6}$	$18\frac{2}{3}$	$58\frac{1}{3}$
f.	$94\frac{1}{2}$	$80\frac{1}{3}$	$72\frac{2}{3}$	$61\frac{5}{6}$
	$18\frac{1}{6}$	$25\frac{1}{6}$	$49\frac{1}{6}$	$33\frac{1}{6}$

Ratio

Oral Problems

1. What part of a dozen (*a*) is 2? (*b*) 3? (*c*) 4? (*d*) 6?

2. If a dozen oranges cost 18 cents, what is the cost (*a*) of a half dozen? (*b*) Of $\frac{1}{3}$ dozen? (*c*) Of $\frac{1}{6}$ dozen?

3. At 3 peaches for 5 cents, (*a*) find the cost of 6 peaches. (*b*) Of 9 peaches. (*c*) Of a dozen peaches.

4. If 3 men can do a piece of work in 20 days, how long would it take 6 men to do the same work?

5. How many men can do in 10 days a piece of work that requires 5 men for 20 days?

6. At the rate of 20 pages in 3 days, how long would it take to finish 100 pages?

7. If 2 fifths of a number is 40, what is 4 fifths of the number?

8. When bricks sell for $7 a thousand, what is the cost of 7,000 bricks?

9. At 3 for 2 cents, find the cost of 60 newspapers.

10. When a 6-acre field produces 100 bushels of wheat, what should a 36-acre field produce at the same rate?

11. At the rate of 40 miles in 3 hours, how long should it take a freight train to go 160 miles?

Fifths

Sight Exercises

1. Give answers:

	A	*B*	*C*	*D*	*E*
a.	$4\frac{1}{5}$	$3\frac{2}{5}$	$5\frac{1}{5}$	$8\frac{3}{5}$	$9\frac{4}{5}$
	$+5\frac{4}{5}$	$+2\frac{3}{5}$	$+6\frac{2}{5}$	$+2\frac{3}{5}$	$+3\frac{4}{5}$
b.	$9\frac{4}{5}$	$8\frac{3}{5}$	$6\frac{2}{5}$	$6\frac{1}{5}$	5
	$-6\frac{2}{5}$	$-3\frac{3}{5}$	$-4\frac{1}{5}$	-2	$-3\frac{1}{5}$
c.	6	7	8	9	8
	$-1\frac{2}{5}$	$-1\frac{3}{5}$	$-1\frac{4}{5}$	$-8\frac{3}{5}$	$-7\frac{2}{5}$

Written Exercises

2. Add:

	A	*B*	*C*	*D*
a.	$19\frac{2}{5}$	51	$35\frac{3}{5}$	$9\frac{4}{5}$
	$20\frac{3}{5}$	$8\frac{2}{5}$	18	$16\frac{4}{5}$
b.	$59\frac{2}{5}$	$36\frac{3}{5}$	$45\frac{4}{5}$	$9\frac{1}{5}$
	$28\frac{2}{5}$	$7\frac{3}{5}$	$37\frac{4}{5}$	$59\frac{2}{5}$
	$6\frac{4}{5}$	$48\frac{3}{5}$	$16\frac{4}{5}$	$29\frac{4}{5}$

3. Subtract:

	A	*B*	*C*	*D*
a.	40	51	62	73
	$-16\frac{1}{5}$	$-25\frac{2}{5}$	$-37\frac{3}{5}$	$-58\frac{4}{5}$
b.	$84\frac{4}{5}$	$95\frac{3}{5}$	$86\frac{2}{5}$	$77\frac{1}{5}$
	$-37\frac{2}{5}$	$-69\frac{1}{5}$	$-57\frac{1}{5}$	-59

Oral Review Problems

1. Grace weighs 64 pounds, and her brother weighs 36 pounds more than Grace. How many pounds do both weigh together?

2. How much less than a dollar has a boy who has a half dollar, a quarter, a dime, a nickel, and a cent?

3. How many pounds are there in 3 loads of hay weighing 21 hundred pounds each?

4. How many seats are there in 8 classrooms containing 40 seats each?

5. How many pounds are there in 320 ounces?

6. Change 2 feet 9 inches to inches.

7. In a school of 480 pupils, one sixth were absent on a stormy day. How many were present?

8. How many feet of wire netting will inclose a plot 31 feet wide, 100 feet long?

9. At 10 cents each, how much fare is received from 64 passengers? How much fare at 5 cents each?

10. Mark has read 50 pages in a book and there are still 32 to read. How many pages are there in the book?

11. An airship sailed 2 hours 45 minutes. How many minutes less than 3 hours was it in the air?

12. How many weeks are there in 350 days? How many weeks and days are there in 355 days?

13. How many half-pint cups are there in 2 quarts?

14. How many days are there in the last two months of the year?

15. At $1\frac{1}{2}$ bushels per acre, how many bushels of wheat are required to sow 40 acres?

16. When wool loses $\frac{1}{4}$ of its weight in washing, what will a quantity of wool weigh after washing if it weighs 80 pounds before it is washed?

17. When oats weigh 32 pounds per bushel, what is the weight of a peck of oats?

18. At the rate of 40 cents for $\frac{1}{2}$ yard, how many yards of silk can be bought for \$ 2.40?

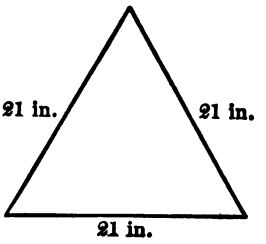
19. (*a*) How many feet of ribbon are required for 30 bows, when each bow takes 24 inches? (*b*) How many yards?

20. At $\frac{1}{2}$ cent a pound, how many pounds of cotton must a man pick to earn (*a*) \$1? (*b*) $\$2\frac{1}{2}$?

21. At 12 miles per hour, (*a*) how many hours does an automobile take to go 480 miles? (*b*) How many days of 10 hours each?

22. (*a*) What part of 63 is 21? (*b*) What part of 63 is 42?

23. A boy had a trip of 120 miles to make. How many miles remained after he had gone $\frac{2}{3}$ of the distance?



24. What is the perimeter of a triangle when each of the three equal sides measures 21 inches?

25. What is the fare for 124 miles at 2 cents per mile?

26. At 20 quarts of gasoline a day, how many gallons will a motor boat use in 10 days?

27. A boy set out 360 plants, of which $\frac{1}{2}$ died. How many remained?

28. How many eggs are there in a box of 30 dozen?

29. A man weighs 150 pounds and his son weighs 50 pounds less. How many pounds do both together weigh?

30. How much more than \$15 is the cost of eight barrels of apples at $\$2\frac{1}{2}$ per barrel?

31. What day of the year is (*a*) Feb. 1? (*b*) March 1, 1915? (*c*) March 1, 1916?

32. How many passengers at 5 cents each will pay \$1.50 in fares?

33. On one trip a conductor collected 5 cents each from 8 passengers and 3 cents each from 10 passengers; how much did he collect on that trip?

34. A conductor collected on one trip \$1.30 in fares, 20 of them being 5-cent fares and the remainder 3-cent fares. How many were 3-cent fares?

35. How many eggs are there in $3\frac{1}{2}$ dozen?

36. What is the cost of 4 horses at \$200 each?

37. How much less than \$500 will be the cost of 8 cows at \$50 each?

38. How much more than \$500 will be the cost of 11 cows at \$50 each?

Written Review Problems

1. A boy weighs 96 pounds, and his father weighs 75 pounds more than the son. What is the total weight of the two?

2. How much less than 10 dollars has a man who has a $5 bill, $2 bill, $1 bill, a silver dollar, a half dollar, a quarter, a dime, a nickel, and a cent?

3. Find the weight of 2 loads of hay weighing 1,975 pounds each.

4. How many seats are there in 16 class rooms each containing 40 seats?

5. How many pounds are there in 496 ounces?

6. Change 15 feet 9 inches to inches.

7. In a school of 475 pupils, two fifths of them were unable to reach school on a very stormy day. How many were present?

8. How many feet of wire netting will inclose a plot 40 feet wide, 140 feet long?

9. At 5 cents each how much fare is received from 97 passengers?

10. Flora has read 147 pages in a book and has still 154 pages to read. How many pages are there in the book?

11. An airship sailed 1 hour 37 minutes. How many minutes longer should it have sailed to remain in the air (*a*) 2 hours? (*b*) 3 hours?

12. How many weeks and days in 366 days?

13. How many quarter pint cups are there in 8 gallons?

14. How many days are there in the last six months of the year?

15. At $1\frac{1}{2}$ bushels per acre how many bushels of wheat are required to sow 48 acres?

16. When raw silk loses $\frac{1}{4}$ of its weight in boiling, what will be the weight after boiling of a quantity that weighs 96 pounds before it is boiled?

17. What is the weight of a half peck of corn at the rate of 56 pounds to the bushel?

18. If corn is bought at the rate of 15 cents a peck, how many bushels can be bought for $21.60?

19. How many yards of ribbon are required for 36 bows, if each bow takes 21 inches?

20. At $\frac{1}{2}$ cent per pound, how many pounds of cotton must a man pick to earn $13.86?

21. At 12 miles per hour, how many days of 8 hours each will it take an automobile to go 480 miles?

22. (*a*) What part of 120 is 24? (*b*) What part of 120 is 72? (*c*) What part of 120 is 96?

23. A boy had a journey of 120 miles to make. How many miles remained after he had finished $\frac{2}{5}$ of the distance?

24. Find the perimeter of a square if each of the 4 equal sides measures $13\frac{1}{2}$ inches.

25. What is the fare for 124 miles at $2\frac{1}{2}¢$ per mile?

26. At 25 quarts of gasoline per day how many gallons will a motor boat use in 32 days?

27. A man set out 396 cabbage plants, $\frac{1}{11}$ of which died. How many remained?

28. How many eggs are there in 6 boxes of 30 dozen each?

29. A man weighs 153 pounds, and his son weighs 58 pounds less. What is the total weight of both?

30. How much more than $15 is the cost of 8 barrels of apples at $2.75 per barrel?

31. What day of the year is (*a*) Feb. 22? (*b*) March 4, 1915? (*c*) May 30, 1916? (*d*) July 4, 1917?

32. How many passengers at 5 cents each will pay $2.45 in fares?

33. On one trip a conductor received 5 cents each from 21 passengers and 3 cents each from 13 passengers; what was the total amount received on that trip?

34. A conductor collected altogether $1.50 in fares, 24 of them being 5-cent fares and the remainder 3-cent fares. How many 3-cent fares were there?

35. How many eggs are there in $9\frac{1}{2}$ dozen?

36. What is the cost of 5 horses at $175 each?

37. How much less than $500 will be the cost of 7 cows at $55 each?

38. How much more than $500 will be the cost of 11 cows at $55 each?

Addition and Subtraction

Sight Drills

1. Add 75 to each of the following numbers:

	A	*B*	*C*	*D*	*E*	*F*	*G*	*H*	*I*	*J*
a.	26	74	48	59	99	18	36	69	95	49
b.	83	19	15	46	96	74	28	66	15	56
c.	47	35	84	26	78	89	57	86	77	38
d.	65	58	37	45	39	55	29	68	92	87
e.	94	27	93	67	85	75	97	16	88	79

2. Subtract each of the foregoing numbers from 120.

3. Add 350 to each of the following numbers:

	A	*B*	*C*	*D*	*E*	*F*
a.	90	120	35	105	2300	900
b.	70	210	46	206	3400	800
c.	50	130	18	307	4500	700
d.	80	320	27	408	5600	640
e.	60	440	39	509	6200	530

4. Give answers rapidly:

Think $121+50+6$. Think $121-50-6$.

	A	*B*	*C*
a.	$121+56$	$122-63$	$162+84$
b.	$121-56$	$140+51$	$162-84$
c.	$134+45$	$140-51$	$173+75$
d.	$134-45$	$151+62$	$173-75$
e.	$122+63$	$151-62$	$184+22$

Addition and Subtraction

Written Exercises

1. Add. Test:

	A	*B*	*C*	*D*
a.	43,875	62,776	48,256	2,862
	2,250	2,342	38,451	2,473
	8,429	5,419	4,836	52,813
	885	763	629	694
	9,680	8,274	985	4,178
b.	13,336	12,643	84,195	47,386
	4,236	656	464	7,562
	48,512	5,472	7,358	3,625
	4,087	58,688	969	10,533
	6,472	4,865	4,272	8,524
c.	15,625	12,075	4,524	58,498
	7,405	4,437	7,525	4,295
	964	43,949	61,329	14,868
	38,228	5,350	2,316	5,564
	2,545	9,527	6,395	9,040
	21,864	20,685	4,567	6,977

2. Subtract. Test by adding upward:

a.	90,000	83,210	75,634	62,350
	7,086	75,065	9,876	48,907
b.	90,090	80,000	70,700	60,000
	83,956	1,234	36,895	5,080

3. Add:

	A	*B*	*C*	*D*
a.	$123.45	$907.48	$680.70	$159.24
	67.98	35.06	90.00	984.85
	76.59	243.65	77.96	76.54
	803.20	76.78	40.90	59.00
	47.00	90.12	465.58	266.13
	59.83	83.75	69.49	29.32
b.	$316.25	$949.34	$469.00	$ 52.63
	57.42	73.44	74.05	265.76
	54.58	750.27	526.51	83.74
	602.72	46.81	57.36	801.82
	59.50	245.54	425.83	724.00
	35.00	382.28	35.10	96.98
c.	$537.46	$456.56	$ 63.42	$ 37.42
	45.91	346.21	633.31	862.00
	48.91	86.90	678.92	375.89
	756.84	27.64	87.14	92.66
	88.00	78.04	694.00	348.15
	68.27	215.84	318.25	438.56

4. Subtract:

	A	*B*	*C*	*D*
a.	$385.34	$472.80	$316.25	$123.45
	198.76	73.86	158.87	67.89
b.	$907.48	$680.70	$469.00	$801.82
	244.65	465.58	74.05	724.98

Multiplication and Division

Drill Exercises

1. Give products:

	A	*B*	*C*	*D*	*E*
a.	2 × 20	3 × 20	4 × 20	5 × 20	2 × 91
b.	2 × 30	3 × 30	4 × 30	5 × 30	3 × 81
c.	2 × 40	3 × 40	4 × 40	5 × 40	4 × 71
d.	2 × 50	3 × 50	4 × 50	5 × 50	5 × 61
e.	2 × 60	3 × 60	4 × 60	5 × 60	6 × 51
f.	2 × 70	3 × 70	4 × 70	5 × 70	7 × 41

	F	*G*	*H*	*I*	*J*
a.	6 × 20	7 × 20	8 × 20	9 × 20	2 × 21
b.	6 × 30	7 × 30	8 × 30	9 × 30	3 × 31
c.	6 × 40	7 × 40	8 × 40	9 × 40	4 × 41
d.	6 × 50	7 × 50	8 × 50	9 × 50	5 × 51
e.	6 × 60	7 × 60	8 × 60	9 × 60	6 × 61
f.	6 × 70	7 × 70	8 × 70	9 × 70	7 × 71

2. Give quotients:

	A	*B*	*C*	*D*	*E*
a.	30)270	40)280	50)450	60)480	20)160
b.	70)350	80)480	90)810	20)180	30)180
c.	80)720	70)630	60)540	50)300	40)360
d.	40)320	30)240	20)160	30)180	50)250
e.	50)350	70)490	90)630	80)560	60)360
f.	60)420	40)360	30)210	50)400	70)280

Oral Problems

1. How many farms of 80 acres each can be made from 640 acres of land?

2. How much would be received for 9 cows, if they were sold at $50 each?

3. A man bought a lot for 6 hundred dollars, and built a house costing 18 hundred dollars. How many hundred dollars did both cost?

4. A cord of wood contains 128 cubic feet. How many cubic feet are there (*a*) in $\frac{1}{2}$ cord? (*b*) In $\frac{1}{4}$ cord?

5. From a box containing 30 dozen eggs, 200 eggs were sold. How many remained?

6. If a man works 309 days in a year, how much does he earn, at the rate of $3 per day?

7. How many cubic inches are there in a block of stone 40 inches long, 30 inches wide, 4 inches thick?

8. At 60 firecrackers to the pack, how many packs contain 540 firecrackers?

9. What is the cost of 480 pounds of butter at $\frac{1}{4}$ dollar per pound?

10. If 21 men require 32 days to do a piece of work, (*a*) what part of this time should it take 84 men to do the same work? (*b*) How many days?

11. A dealer received $32 each for 3 suits of clothes. How much less than $100 did he receive for them?

Multiplying and Dividing by 11

Oral Exercises

1. Count by 11's from 11 to 132.

2. How many are (*a*) two 11's? (*b*) Eleven 2's? (*c*) Three 11's? (*d*) Eleven 3's? (*e*) Four 11's? (*f*) Eleven 4's (*g*) Five 11's? (*h*) Eleven 5's? (*i*) Six 11's? (*j*) Eleven 6's? (*k*) Seven 11's? (*l*) Eleven 7's? (*m*) Eight 11's? (*n*) Eleven 8's? (*o*) Nine 11's? (*p*) Eleven 9's?

Written Exercises

1. Multiply by 11:

	A	*B*	*C*	*D*	*E*
a.	111	222	333	444	555
b.	666	777	888	909	876
c.	765	654	543	432	321
d.	454	565	787	898	579

2. Divide by 11:

	A	*B*	*C*	*D*
a.	1,210	1,342	1,595	1,859
b.	2,761	3,949	5,423	7,403
c.	9,119	8,712	7,260	5,808

3. Divide by 11. Find quotients and remainders:

	A	*B*	*C*	*D*
a.	3,681	8,937	9,432	9,004
b.	3,700	9,000	8,400	6,700

Multiplying and Dividing by 12

Learn the following table:

12 times 1 are 12	12 times 7 are 84
12 times 2 are 24	12 times 8 are 96
12 times 3 are 36	12 times 9 are 108
12 times 4 are 48	12 times 10 are 120
12 times 5 are 60	12 times 11 are 132
12 times 6 are 72	12 times 12 are 144

Oral Exercises

1. How many inches are there in 11 feet?

2. At 12 cents per yard, what is paid for 7 yards of muslin?

3. How many cents are 12 nickels?

4. How many eggs are there in 8 dozen?

5. Find the number of square inches in 12 rows, each containing 12 square inches.

6. How many cents are there in a dozen dimes?

7. How many panes of glass are there in 6 windows, each containing 12 panes?

8. How many feet are there in 12 yards?

9. How many years are there in 60 months?

10. How many dimes are there in $1.20?

11. How many inches in 3 feet 6 inches?

12. How many years and months in 40 months?

13. How many square feet are there in a plot of ground 12 feet square?

Sight Exercises

Give products:

	A	*B*	*C*	*D*
a.	9 × 12	12 × 8	20 × 12	12 × 30
b.	6 × 12	12 × 5	12 × 40	50 × 12
c.	7 × 12	12 × 4	60 × 12	12 × 70
d.	3 × 12	12 × 2	12 × 80	90 × 12

Written Exercises

Multiply by 12:

	A	*B*	*C*	*D*	*E*
a.	111	222	333	444	555
b.	666	777	818	729	645
c.	564	765	654	543	432
d.	321	454	565	787	809

Sight Exercises

Give quotients:

	A	*B*	*C*	*D*
a.	120 ÷ 12	96 ÷ 12	360 ÷ 12	840 ÷ 12
b.	144 ÷ 12	48 ÷ 12	600 ÷ 12	960 ÷ 120
c.	108 ÷ 12	60 ÷ 12	840 ÷ 12	720 ÷ 12
d.	132 ÷ 12	84 ÷ 12	480 ÷ 12	240 ÷ 120

Written Exercises

Divide by 12:

	A	*B*	*C*	*D*
a.	1,332	1,572	1,620	1,884
b.	2,772	3,948	5,424	7,416
c.	8,712	9,180	8,580	6,756
d.	5,088	3,384	4,500	6,336

Multipliers containing Ciphers

Sight Exercises

Give products:

	A	*B*	*C*	*D*	*E*	*F*
a.	21 × 400	32 × 300	11 × 500	22 × 400	33 × 300	23 × 300
b.	2,100 × 4	3,200 × 3	1,100 × 5	2,200 × 4	3,200 × 3	2,200 × 3
c.	210 × 40	320 × 30	110 × 50	120 × 40	130 × 30	210 × 30

Written Exercises

1. Multiply 185 by 500.

	PROCESS
185 500 92500 *Ans.*	The product by 0 ones is 0; write 0 in the ones' column. The product by 0 tens is 0; write 0 in the tens' column. Place the right-hand figure of the product by 5 hundred in the hundreds' column.

2. Multiply:

	A	*B*	*C*
a.	486 × 200	329 × 300	239 × 400
b.	184 × 500	157 × 600	139 × 700
c.	118 × 800	109 × 900	478 × 200
d.	327 × 300	248 × 400	177 × 500

2. Multiply 427 by 230.

427 230 12810 854 98210 *Ans.*	PROCESS The product by 0 ones is 0; write 0 in the ones' column. Place the right-hand figure of the product by 3 under 3. Place the right-hand figure of the product by 2 under 2.

	A	*B*	*C*
a.	475 × 210	319 × 320	217 × 430
b.	175 × 520	146 × 630	128 × 740
c.	119 × 830	105 × 950	337 × 250
d.	309 × 360	208 × 470	170 × 580

3. Multiply (*a*) 408 by 205; (*b*) 205 by 408.

(*a*)	408 205 2040 8160 83640 *Ans.*	PROCESS In (*a*) place the right-hand figure of the product by 5 in the ones' column. Since the product by 0 tens	(*b*)	205 408 1640 8200 83640 *Ans.*

is 0, place a cipher in the tens' column. Place the right-hand figure of the product by 2 hundred in the hundreds' column of the same line.

	A	*B*	*C*
a.	102 × 806	108 × 907	207 × 405
b.	203 × 409	305 × 306	506 × 108
c.	389 × 205	473 × 205	309 × 309

4. Multiply (*a*) 279 by 346; (*b*) 346 by 279.

PROCESS

(*a*)			(*b*)		
279		In (*a*) place the right-hand figure of the product by 6 under 6, the right-hand figure of the product by 4 under 4, and the right-hand figure of the product by 3 under 3.	346		
346			279		
1674			3114		
1116			2422		
837			692		
96534	*Ans.*		96534	*Ans.*	

Test (*a*) by multiplying 346 by 279, as in (*b*). If the results agree, both products are probably correct.

	A	*B*	*C*
a.	235 × 123	246 × 321	325 × 235
b.	437 × 214	562 × 173	684 × 142
c.	784 × 125	863 × 114	746 × 134
d.	527 × 184	408 × 238	336 × 260
e.	150 × 630	227 × 398	317 × 318
f.	208 × 407	638 × 156	416 × 239
g.	356 × 249	256 × 349	583 × 158
h.	475 × 206	567 × 146	900 × 106
i.	136 × 634	678 × 135	760 × 130
j.	235 × 389	789 × 127	508 × 103
k.	480 × 108	890 × 112	326 × 275
l.	340 × 690	220 × 780	156 × 870
m.	305 × 609	175 × 606	124 × 642
n.	208 × 504	234 × 567	205 × 350

Long Division

Written Exercises

1. Divide 58,376 by 99; 43,721 by 975; 68,374 by 3,456.

PROCESS

Ans. $589\frac{65}{99}$	*Ans.* $44\frac{821}{975}$	*Ans.* $19\frac{2710}{3456}$
99)58376	975)43721	3456)68374
495	3900	3456
887	4721	33814
792	3900	31104
956	821	2710
891		
65		

Write the first quotient figure over the last figure of the first partial dividend. Write a quotient figure (or a cipher) over each remaining figure of the dividend.

2. Divide:

	A	*B*	*C*
a.	8,058 ÷ 102	54,324 ÷ 108	86,785 ÷ 1,021
b.	9,315 ÷ 405	41,814 ÷ 207	93,472 ÷ 2,032
c.	9,178 ÷ 706	65,178 ÷ 306	96,736 ÷ 3,023
d.	9,911 ÷ 901	90,720 ÷ 405	83,288 ÷ 4,056
e.	9,308 ÷ 812	88,704 ÷ 504	90,136 ÷ 5,007
f.	9,824 ÷ 614	96,480 ÷ 603	96,496 ÷ 6,031
g.	9,545 ÷ 415	98,982 ÷ 702	98,308 ÷ 7,022
h.	9,592 ÷ 218	96,360 ÷ 803	96,420 ÷ 8,035

Oral Exercises

1. At 20¢ each, how many articles can be bought for

	A	*B*	*C*	*D*	*E*
a.	20¢?	60¢?	100¢?	140¢?	180¢?
b.	40¢?	80¢?	120¢?	160¢?	200¢?

2. At 19¢ each, how many articles can be bought for

a.	20¢?	60¢?	120¢?	160¢?	180¢?
b.	40¢?	80¢?	140¢?	180¢?	200¢?

and how many cents remain in each case?

3. Give the number of articles at 18¢ each that can be bought for each of the following sums, and state the amount remaining in each:

a.	40¢	20¢	100¢	160¢	180¢
b.	80¢	60¢	140¢	120¢	200¢

4. Give quotients:

	A	*B*	*C*	*D*
a.	30)60	30)120	30)180	30)240
b.	30)90	30)150	30)210	30)270

5. Give quotients and remainders:

a.	29)30	29)90	29)150	29)210
b.	29)60	29)120	29)180	29)240
c.	28)30	28)90	28)150	28)210

Long Division

Drill Exercises

Give quotients:

NOTE. Omit remainders, if any.

	A	*B*	*C*	*D*
a.	200)1,800	201)1,800	199)1,800	250)1,800
b.	300)2,400	302)2,400	299)2,400	360)2,400
c.	400)2,800	403)2,800	399)2,800	470)2,800
d.	500)2,500	504)2,500	499)2,500	580)2,500
e.	600)4,200	605)4,200	599)4,200	690)4,200
f.	700)6,300	704)6,300	699)6,300	790)6,300
g.	800)5,600	803)5,600	799)5,600	880)5,600
h.	900)7,200	902)7,200	899)7,200	999)7,200
i.	240)1,920	241)1,920	239)1,920	249)1,920
j.	320)2,240	321)2,240	319)2,240	320)2,239
k.	410)3,690	411)3,690	409)3,690	410)3,689
l.	520)2,080	521)2,080	519)2,080	520)2,076
m.	630)3,780	631)3,780	629)3,780	630)3,774
n.	710)4,970	711)4,970	709)4,970	710)4,953
o.	820)4,100	821)4,100	819)4,100	820)4,096
p.	910)8,190	911)8,190	909)8,190	910)8,183

Oral Problems

1. What is the total cost of a lot at 3 hundred dollars and a house at 21 hundred dollars?

2. A man had 31 hundred dollars in bank. How much remained after he drew out 8 hundred dollars?

3. Give the cost of 21 horses at $300 each.

4. A driver sold 30 cows at $41 each. How much did he receive for them?

5. At 4¢ per pound what is the cost of a barrel of sugar containing 300 pounds?

6. How many 20-acre fields are there in a farm of 640 acres?

7. At 20 bushels to the acre what would be the yield of 34 acres of wheat?

8. How long would a train require to go 820 miles at the rate of 41 miles an hour?

9. If a man has saved $991, how much more must be saved to have $1,000?

10. How many square yards are there in a plot of ground 32 yards long, 30 yards wide?

11. Mr. Payne has two farms, one of 260 acres and the other of 120 acres. How many acres are there in both?

12. If 3 men can do a piece of work in 21 days, how long would it require 1 man to do it? 7 men?

13. How much shall I have left of $1,000 after paying for 3 horses at $300 each?

Written Problems

1. What is the total cost of a lot at $375 and a house at $2,475?

2. A man had $950 in bank. How much remained after he took out $875.75?

3. Find the cost of 21 horses at $375 each.

4. A drover sold 30 cows at $45 each. How much did he receive for them?

5. At 4¢ per pound what is the cost of a barrel of sugar containing 375 pounds?

6. How many 25-acre plots can be made out of 600 acres of land?

7. At 19 bushels to the acre what would be the yield of 34 acres of wheat?

8. How long would a train require to go 975 miles at the rate of 30 miles per hour?

9. A man requires $1,000; he has already saved $837.50. How much does he still need?

10. What is the area of a plot of ground 32 yards long, 29 yards wide?

11. Mr. Black has two farms, one of $269\frac{1}{2}$ acres and the other of $110\frac{1}{2}$ acres. How much land is there in both?

12. If 3 men can do a piece of work in 35 days, how long would it require 1 man to do it? 7 men?

13. How much change should I receive out of a $1,000 bill given in payment for 3 horses at $317 each?

Written Exercises

In dividing 969 by 19, find the first quotient figure by dividing 9 by 2, 19 being nearly 20. In dividing 975 by 39, get the first quotient figure by dividing 9 by 4.

1. Divide:

	A	*B*	*C*
a.	969 ÷ 19	8,213 ÷ 191	61,280 ÷ 1,915
b.	928 ÷ 29	9,376 ÷ 293	82,124 ÷ 2,933
c.	975 ÷ 39	9,480 ÷ 395	86,922 ÷ 3,951
d.	784 ÷ 49	7,455 ÷ 497	89,496 ÷ 4,972
e.	885 ÷ 59	8,386 ÷ 599	83,916 ÷ 5,994
f.	897 ÷ 69	8,376 ÷ 698	90,584 ÷ 6,968
g.	869 ÷ 79	6,368 ÷ 796	83,648 ÷ 7,968
h.	979 ÷ 89	9,834 ÷ 894	71,592 ÷ 8,949
i.	891 ÷ 99	7,936 ÷ 992	69,489 ÷ 9,927
j.	704 ÷ 88	9,691 ÷ 881	52,890 ÷ 8,815
k.	936 ÷ 78	9,396 ÷ 783	70,497 ÷ 7,833
l.	952 ÷ 68	9,590 ÷ 685	82,212 ÷ 6,851
m.	928 ÷ 58	9,436 ÷ 589	94,272 ÷ 5,892
n.	864 ÷ 48	9,724 ÷ 488	82,348 ÷ 4,844
o.	988 ÷ 38	9,650 ÷ 386	88,918 ÷ 3,866
p.	952 ÷ 28	9,690 ÷ 285	99,960 ÷ 2,856
q.	936 ÷ 18	9,752 ÷ 184	95,836 ÷ 1,843
r.	945 ÷ 27	9,936 ÷ 276	99,132 ÷ 2,762
s.	999 ÷ 37	9,672 ÷ 372	93,025 ÷ 3,721

Oral Problems

1. How many ounces are there in 3 pounds?

2. Change 50 ounces to pounds and ounces.

3. How many postage stamps are there in a sheet 15 stamps long, 3 stamps wide?

4. What is the cost of 23 two-cent stamps?

5. At 14 cents a gallon, how many gallons of oil can be bought for 42 cents?

6. If 45 men require 30 days to do a piece of work, how long would it take 15 men to do it?

7. At 16 bushels to the acre, how many acres will produce 48 bushels?

8. Seven times 8 are how many more than 50?

9. At the rate of 15 examples an hour, how long does it require a girl to work 45 examples?

10. How many times is 99 contained in 100? what is the remainder? How many times in 200? what is the remainder? In 300? what is the remainder? In 500? what is the remainder?

11. How many times is 98 contained in 100? what is the remainder? In 300? what is the remainder? In 700? what is the remainder?

12. At 99¢ a yard, how many yards of silk can be bought for $6, and how many cents change are there?

13. A girl bought 7 yards of goods at 99¢ per yard and received 7¢ change. How much did she give the storekeeper?

Multiples and Factors

Since 14 is divisible by 2 and by 7, it is a *multiple* of these numbers; 12 is a multiple of 2, of 3, of 4, and of 6.

Since 14 is divisible by 2 and by 7, these two numbers are *factors* of 14; 2, 3, 4, and 6 are factors of 12.

1 is not considered a factor of a number, neither is the number itself.

Oral Exercises

1. What number will exactly divide 25? 49? 81? 121?

2. What two numbers will exactly divide 21? 26? 33? 34? 35? 39? 46? 51? 55? 57?

Prime Numbers

Since they have no factors, 1, 2, 3, 5, etc., are called *prime numbers.*

Sight Exercises

1. Name a prime number between 6 and 9.

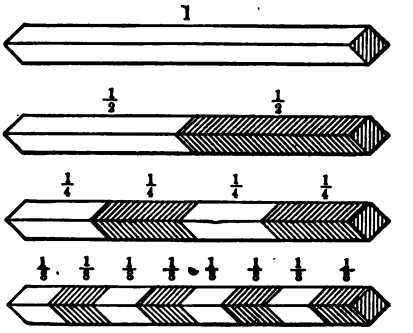
2. Name two prime numbers between 10 and 15. Two between 16 and 20. One between 21 and 25. One between 25 and 30.

3. Name two prime numbers between 30 and 40. Three between 40 and 50. Two between 50 and 60. Two between 60 and 70. Three between 70 and 80. Two between 80 and 90. One between 90 and 100.

Reduction

Oral Exercises

When a thing is divided into 8 parts, each part is called an eighth, written $\frac{1}{8}$.



1. How many eighths are there in a half? In a quarter? In three fourths?

2. Change to 8ths:

a. $\frac{1}{2}$. *b.* $\frac{1}{4}$. *c.* $\frac{3}{4}$.

In the fractions $\frac{1}{2}$, $\frac{1}{4}$, $\frac{1}{8}$, the numbers 2, 4, 8, are called the *denominators*.

In the fractions $\frac{1}{8}$, $\frac{3}{8}$, $\frac{5}{8}$, $\frac{7}{8}$, the numbers 1, 3, 5, 7, are called the *numerators*.

The numerator and the denominator are called the *terms* of the fraction.

When $\frac{2}{8}$ is changed to $\frac{1}{4}$, $\frac{2}{4}$ and $\frac{4}{8}$ to $\frac{1}{2}$, $\frac{6}{8}$ to $\frac{3}{4}$, etc., each fraction is changed to *lowest terms*.

3. Change to lowest terms:

	A	*B*	*C*	*D*	*E*
a.	$\frac{2}{4}$	$\frac{2}{8}$	$\frac{3}{6}$	$\frac{4}{8}$	$\frac{6}{8}$
b.	$\frac{6}{12}$	$\frac{4}{6}$	$\frac{2}{6}$	$\frac{8}{12}$	$\frac{9}{12}$

4. Change to a whole or to a mixed number:

	A	*B*	*C*	*D*	*E*
a.	$\frac{3}{2}$	$\frac{5}{4}$	$\frac{9}{3}$	$\frac{11}{6}$	$\frac{13}{8}$
b.	$\frac{17}{12}$	$\frac{9}{4}$	$\frac{7}{3}$	$\frac{11}{8}$	$\frac{13}{6}$

Adding and Subtracting Fractions

Preparatory Exercises

To add or to subtract fractions having different denominators, the denominators must be made the same; that is, the fractions must have a *common denominator*.

1. Add $\frac{1}{2}$ and $\frac{1}{4}$. What is the common denominator?

2. Add $\frac{1}{2}$ and $\frac{1}{6}$. What is the common denominator?

3. (*a*) What is the common denominator of $\frac{1}{2}$, $\frac{1}{3}$, and $\frac{1}{6}$? (*b*) Of $\frac{1}{2}$, $\frac{1}{4}$, and $\frac{1}{8}$? (*c*) Of $\frac{1}{2}$ and $\frac{1}{3}$? (*d*) Of $\frac{1}{4}$ and $\frac{1}{3}$? (*e*) Of $\frac{1}{4}$ and $\frac{1}{6}$? (*f*) Of $\frac{1}{3}$, $\frac{1}{4}$, and $\frac{1}{6}$?

Sight Exercises

Give answers:

	A	*B*	*C*	*D*	*E*	*F*	*G*
a.	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{4}$	$\frac{1}{2}$	$\frac{1}{4}$	$\frac{3}{4}$	$\frac{3}{4}$
	$+\frac{1}{4}$	$+\frac{1}{8}$	$+\frac{1}{8}$	$+\frac{3}{8}$	$+\frac{3}{8}$	$+\frac{1}{8}$	$+\frac{3}{8}$
b.	$1\frac{1}{2}$	$1\frac{1}{2}$	$1\frac{1}{4}$	$1\frac{1}{2}$	$1\frac{1}{4}$	$1\frac{3}{4}$	$1\frac{3}{4}$
	$+\frac{1}{4}$	$+\frac{1}{8}$	$+\frac{1}{8}$	$+\frac{3}{8}$	$+\frac{3}{8}$	$+\frac{1}{8}$	$+\frac{3}{8}$
c.	$1\frac{1}{2}$	$1\frac{3}{4}$	$1\frac{1}{2}$	$1\frac{1}{4}$	$1\frac{3}{4}$	$1\frac{3}{4}$	$1\frac{3}{8}$
	$+\frac{3}{4}$	$+\frac{1}{8}$	$+\frac{5}{8}$	$+\frac{5}{8}$	$+\frac{5}{8}$	$+\frac{7}{8}$	$+\frac{3}{8}$
d.	$2\frac{1}{8}$	$2\frac{3}{8}$	$2\frac{5}{8}$	$2\frac{7}{8}$	$2\frac{1}{2}$	$2\frac{5}{8}$	$2\frac{7}{8}$
	$+\frac{1}{2}$	$+\frac{1}{4}$	$+\frac{3}{4}$	$+\frac{1}{2}$	$+\frac{7}{8}$	$+\frac{5}{8}$	$+\frac{7}{8}$
e.	1	1	1	1	$1\frac{1}{2}$	$1\frac{1}{4}$	$1\frac{3}{8}$
	$-\frac{1}{8}$	$-\frac{3}{8}$	$-\frac{5}{8}$	$-\frac{7}{8}$	$-\frac{1}{8}$	$-\frac{1}{8}$	$-\frac{1}{4}$

Adding Mixed Numbers

Oral Problems

1. How much cloth is needed for a suit of clothes if 4 yards are needed for the coat, $1\frac{1}{2}$ yards for the vest, and $2\frac{1}{2}$ yards for the trousers?

2. How many inches (*a*) in $\frac{1}{3}$ foot? (*b*) In $\frac{1}{6}$ foot? (*c*) In $\frac{1}{3}$ ft. + $\frac{1}{6}$ ft.? (*d*) What part of a foot is 6 inches? (*e*) What part of a foot is $\frac{1}{2}$ ft. + $\frac{1}{6}$ ft.?

3. (*a*) What is the smallest number that is divisible by 3, by 4, and by 6? (*b*) What is the least common denominator of $\frac{1}{3}$, $\frac{1}{4}$, and $\frac{1}{6}$? (*c*) How many 12ths in the sum of $\frac{1}{3}$, $\frac{1}{4}$, and $\frac{1}{6}$? (*d*) $\frac{1}{3}+\frac{1}{4}+\frac{1}{6}$ = how many fourths?

4. After a man had sold $\frac{1}{3}+\frac{1}{4}+\frac{1}{6}$ of his farm, (*a*) what part of his farm was sold? (*b*) What part did he still own? (*c*) If he still owned 40 acres, how many acres did he own at first?

Written Exercises

Add:

	A	*B*	*C*	*D*	*E*
a.	$20\frac{1}{8}$	$16\frac{3}{8}$	32	$46\frac{3}{8}$	$72\frac{5}{8}$
	13	$7\frac{5}{8}$	$8\frac{1}{8}$	4	$20\frac{5}{8}$
	$3\frac{3}{8}$	14	$19\frac{7}{8}$	$5\frac{7}{8}$	6
b.	$17\frac{1}{2}$	30	$14\frac{1}{4}$	$21\frac{3}{4}$	8
	13	$18\frac{1}{2}$	$5\frac{1}{8}$	16	$22\frac{1}{2}$
	$7\frac{3}{8}$	$6\frac{1}{8}$	19	$9\frac{7}{8}$	$15\frac{5}{8}$

Subtracting Mixed Numbers

Oral Problems

1. An airship remained in the air $58\frac{1}{2}$ minutes. How many minutes is that less than an hour?

2. After spending $\frac{1}{2}$ and $\frac{1}{3}$ of his money, (*a*) what part of his money did a boy still have? (*b*) If he then had 10 cents, how much had he at first?

3. A man had to walk 10 miles. He walks $3\frac{1}{2}$ miles the first hour and $3\frac{1}{4}$ the second hour. How many miles has he still to go?

4. Out of 100 yards of cloth $92\frac{1}{2}$ yards have been used. How many yards remain?

5. How much more than \$50 will be the cost of a dress at $\$40\frac{3}{4}$ and a trunk at $\$9\frac{1}{2}$?

Written Exercises

Subtract:

	A	*B*	*C*	*D*	*E*
a.	30	43	74	65	72
	$-18\frac{1}{2}$	$-19\frac{1}{4}$	$-27\frac{3}{4}$	$-38\frac{1}{3}$	$-47\frac{2}{3}$
b.	50	83	92	36	45
	$-24\frac{1}{6}$	$-46\frac{5}{6}$	$-25\frac{7}{8}$	$-16\frac{5}{8}$	$-26\frac{7}{8}$
c.	$30\frac{3}{4}$	$42\frac{5}{6}$	$51\frac{7}{8}$	$62\frac{5}{8}$	$71\frac{3}{8}$
	$-18\frac{1}{2}$	$-26\frac{1}{2}$	$-39\frac{1}{2}$	$-13\frac{1}{2}$	$-22\frac{1}{4}$

Addition

Written Exercises

1. Find the sum of $30\frac{3}{4} + 25\frac{5}{6} + 8\frac{2}{3}$.

PROCESS

To the right of the addends draw a vertical line and from its top draw a horizontal line. Above the latter write 12 (the least common denonimator). Change the fractions to $\frac{9}{12}$, $\frac{10}{12}$, and $\frac{8}{12}$, respectively, and write 9, 10, and 8 (the new numerators) under 12 (the new denominator). Add these numerators, and write 27 (their sum), over 12 (the common denominator), making the sum of the fractions $\frac{27}{12}$. Change this first to $2\frac{3}{12}$, and then to $2\frac{1}{4}$. Write $\frac{1}{4}$ under the original fractions, and carry 2 to the whole numbers.

		12
	$30\frac{3}{4}$	9
	$25\frac{5}{6}$	10
	$8\frac{2}{3}$	8
Ans.	$65\frac{1}{4}$	$\frac{27}{12} = 2\frac{3}{12} = 2\frac{1}{4}$

2. Find sums:

	A	*B*	*C*	*D*	*E*
a.	$30\frac{1}{4}$	$16\frac{3}{4}$	$5\frac{1}{2}$	$60\frac{1}{2}$	$25\frac{2}{3}$
	$25\frac{1}{6}$	$8\frac{1}{6}$	$20\frac{1}{4}$	$9\frac{3}{4}$	$18\frac{3}{4}$
	$8\frac{1}{3}$	$39\frac{1}{3}$	$8\frac{5}{6}$	$18\frac{7}{8}$	6

3. Add:

b.	$12\frac{1}{8}$	$2\frac{1}{5}$	$15\frac{3}{8}$	$4\frac{3}{5}$	$4\frac{2}{5}$
	$4\frac{1}{6}$	$14\frac{1}{8}$	$19\frac{5}{6}$	$20\frac{3}{8}$	$13\frac{1}{4}$
	$7\frac{1}{3}$	$6\frac{1}{10}$	$7\frac{1}{3}$	$6\frac{1}{10}$	$7\frac{9}{10}$

Addition and Subtraction

Written Exercises

1. A field contained $35\frac{9}{10}$ acres of land. $15\frac{3}{4}$ acres were sold. How much remained?

PROCESS

Write 20 (the least common denominator), as in addition, and 18 and 15 (the new numerators). Place 3 (their difference) over 20 (the common denominator), making the difference between the fractions $\frac{3}{20}$. Write the latter under the original fractions, then subtract the whole numbers.

$$\begin{array}{rr|r} & & 20 \\ & 35\frac{9}{10} & 18 \\ & 15\frac{3}{4} & 15 \\ \hline \textit{Ans.} & 20\frac{3}{20} & \frac{3}{20} \end{array}$$

2. Subtract:

	A	*B*	*C*	*D*	*E*
a.	$15\frac{2}{3}$	$30\frac{4}{5}$	$27\frac{5}{6}$	$54\frac{5}{6}$	$40\frac{3}{4}$
	$-8\frac{3}{8}$	$-14\frac{3}{8}$	$-9\frac{3}{4}$	$-26\frac{7}{9}$	$-6\frac{7}{10}$
b.	$64\frac{2}{3}$	$92\frac{5}{6}$	$87\frac{3}{4}$	$73\frac{5}{6}$	$50\frac{7}{8}$
	$-16\frac{2}{5}$	$-24\frac{3}{8}$	$-59\frac{2}{5}$	$-8\frac{3}{10}$	$-23\frac{7}{10}$

3. Find answers:

c.	$35\frac{3}{4}$	$35\frac{3}{4}$	$42\frac{2}{3}$	$42\frac{2}{3}$	$26\frac{5}{6}$
	$+16\frac{2}{3}$	$-16\frac{2}{3}$	$+8\frac{3}{10}$	$-8\frac{3}{10}$	$+9\frac{4}{5}$
d.	$26\frac{5}{6}$	$67\frac{7}{8}$	$67\frac{7}{8}$	$84\frac{7}{12}$	$84\frac{7}{12}$
	$-9\frac{4}{5}$	$+29\frac{5}{12}$	$-29\frac{5}{12}$	$+18\frac{5}{9}$	$-18\frac{5}{9}$
e.	$72\frac{7}{8}$	$72\frac{7}{8}$	$90\frac{5}{6}$	$90\frac{5}{6}$	$52\frac{9}{10}$
	$+6\frac{2}{3}$	$-6\frac{2}{3}$	$+8\frac{3}{8}$	$-8\frac{3}{8}$	$+27\frac{3}{4}$

Fractional Parts of Numbers

Oral Exercises

1. How many ounces (*a*) in $\frac{1}{8}$ pound? (*b*) In $\frac{3}{8}$ pound? (*c*) In $\frac{5}{8}$ pound? (*d*) In $\frac{7}{8}$ pound?

2. Find (*a*) $\frac{1}{8}$ of 24. (*b*) $\frac{3}{8}$ of 24. (*c*) $\frac{5}{8}$ of 24. (*d*) $\frac{7}{8}$ of 24.

3. How many minutes (*a*) in $\frac{1}{5}$ hour? (*b*) In $\frac{2}{5}$ hour? (*c*) In $\frac{3}{5}$ hour? (*d*) In $\frac{4}{5}$ hour? (*e*) In $\frac{1}{6}$ hour? (*f*) In $\frac{5}{6}$ hour? (*g*) In $\frac{1}{2}$ hour? (*h*) In $\frac{1}{3}$ hour? (*i*) In $\frac{2}{3}$ hour? (*j*) In $\frac{1}{4}$ hour? (*k*) In $\frac{3}{4}$ hour?

4. How many hours (*a*) in $\frac{1}{2}$ day? (*b*) In $\frac{1}{4}$ day? (*c*) In $\frac{1}{3}$ day? (*d*) In $\frac{3}{4}$ day? (*e*) In $\frac{2}{3}$ day? (*f*) In $\frac{1}{8}$ day? (*g*) In $\frac{3}{8}$ day? (*h*) In $\frac{5}{8}$ day? (*i*) In $\frac{7}{8}$ day? (*j*) In $\frac{1}{6}$ day? (*k*) In $\frac{5}{6}$ day?

Sight Exercises

Give answers:

	A	*B*	*C*	*D*
a.	$\frac{1}{2}$ of 168	$\frac{1}{2}$ of 184	$\frac{1}{2}$ of 250	$\frac{1}{2}$ of 248
b.	$\frac{1}{3}$ of 366	$\frac{1}{3}$ of 396	$\frac{1}{3}$ of 369	$\frac{1}{3}$ of 648
c.	$\frac{1}{4}$ of 440	$\frac{1}{4}$ of 484	$\frac{1}{4}$ of 888	$\frac{1}{4}$ of 848
d.	$\frac{1}{5}$ of 255	$\frac{1}{5}$ of 300	$\frac{1}{5}$ of 555	$\frac{1}{5}$ of 525
e.	$\frac{1}{6}$ of 606	$\frac{1}{6}$ of 486	$\frac{1}{6}$ of 366	$\frac{1}{6}$ of 420
f.	$\frac{1}{8}$ of 168	$\frac{1}{8}$ of 248	$\frac{1}{8}$ of 328	$\frac{1}{8}$ of 480
g.	$\frac{2}{3}$ of 120	$\frac{3}{4}$ of 120	$\frac{1}{5}$ of 150	$\frac{2}{5}$ of 150
h.	$\frac{3}{5}$ of 150	$\frac{4}{5}$ of 150	$\frac{5}{6}$ of 180	$\frac{3}{8}$ of 160

Written Problems

1. A man sold $\frac{7}{8}$ of his farm of 168 acres. How many acres did he sell?

PROCESS

Find 1 eighth of 168 by dividing 168 by 8, $\frac{7}{8}$ of $\overset{2}{\cancel{168}}\ \overset{1}{}$ A. = 147 A. *Ans.*
canceling these numbers, and writing the quotient 21, over the former. Multiply 21 by 7 to find 7 eighths.

The abbreviation for acres is A.; for pounds, lb.; for yards, yd.; for miles, mi.

2. How many pounds are there in $\frac{3}{8}$ of a ton of 2,000 pounds?

3. How many yards are there in $\frac{3}{4}$ mile, a mile containing 1,760 yards?

4. A planter sold $\frac{2}{3}$ of his crop of cotton consisting of 258 bales. How many bales did he sell?

5. Of a grove of 360 trees, three fifths are pine trees. How many are pine trees?

6. How far has a train gone when it has gone $\frac{5}{8}$ of the distance from New York to Washington, 224 miles?

7. A man sold for $\frac{7}{8}$ of its cost a farm that cost him $2,800. What did he receive for it?

8. An acre contains 160 square rods. How many square rods are there in a plot containing $\frac{4}{5}$ acre?

9. A piece of cloth contains 56 yards. How many yards are left after $\frac{3}{4}$ of the piece is used?

Multiplying by a Mixed Number

Preparatory Exercises

1. If a horse travels at the rate of 6 miles an hour, (*a*) how far does he go in $\frac{1}{2}$ hour? (*b*) In an hour and a half?

2. How many miles are $1\frac{1}{2}$ times 6 miles?

3. At 12 cents a yard, what is the cost (*a*) of 2 yards of muslin? (*b*) Of $\frac{1}{4}$ yard? (*c*) Of $2\frac{1}{4}$ yards?

4. How many cents are $2\frac{1}{4}$ times 24 cents?

5. At \$ 40 per acre what is the cost (*a*) of $\frac{1}{8}$ acre of land? (*b*) Of $3\frac{1}{8}$ acres?

6. How many dollars are $3\frac{1}{8}$ times \$ 40?

7. How many bushels of oats can be raised (*a*) on $\frac{3}{4}$ acre at the rate of 40 bushels to the acre? (*b*) On $1\frac{3}{4}$ acres?

8. How many bushels are $1\frac{3}{4}$ times 40 bushels?

Sight Exercises

Give products:

	A	*B*	*C*	*D*	*E*	*F*
a.	$24 \times 1\frac{1}{2}$	$24 \times 1\frac{1}{3}$	$24 \times 1\frac{1}{4}$	$24 \times 1\frac{1}{6}$	$24 \times 1\frac{1}{8}$	$30 \times 1\frac{1}{6}$
b.	$60 \times 1\frac{1}{2}$	$60 \times 1\frac{1}{3}$	$40 \times 1\frac{1}{4}$	$60 \times 1\frac{1}{6}$	$80 \times 1\frac{1}{8}$	$80 \times 1\frac{1}{2}$
c.	$30 \times 1\frac{1}{3}$	$30 \times 2\frac{1}{3}$	$40 \times 2\frac{1}{4}$	$30 \times 2\frac{1}{6}$	$40 \times 2\frac{1}{8}$	$20 \times 3\frac{1}{2}$

Written Exercises

1. A man makes 87 hats in a week. How many will he make in $2\frac{1}{3}$ weeks?

PROCESS		87 hats $2\frac{1}{3}$
Get 1 third of 87 by dividing 87 by 3. Place the right-hand figure of the product of 87 by 2 in the ones' column.	($\frac{1}{3}$ times 87)	29
	(2 times 87)	174
	($2\frac{1}{3}$ times 87)	203 hats

2. Find products. Consider the mixed number the multiplier.

	A	*B*	*C*	*D*
a.	$86 \times 2\frac{1}{2}$	$84 \times 3\frac{1}{4}$	$96 \times 2\frac{1}{3}$	$34 \times 4\frac{1}{2}$
b.	$88 \times 4\frac{1}{8}$	$75 \times 5\frac{1}{5}$	$72 \times 3\frac{1}{6}$	$25 \times 3\frac{1}{5}$
c.	$72 \times 3\frac{1}{3}$	$92 \times 4\frac{1}{4}$	$84 \times 5\frac{1}{6}$	$48 \times 2\frac{1}{8}$

3. Multiply 78 by $4\frac{5}{6}$.

PROCESS		78 $4\frac{5}{6}$
First find $\frac{1}{6}$ of 78, which is 13. Multiply the latter by 5 to obtain $\frac{5}{6}$ of 78. Multiply 78 by 4 and combine the two results.	($\frac{1}{6}$ of 78)	13
	(Multiply by 5)	$\times 5$
	($\frac{5}{6}$ of 78)	65
	(4 times 78)	312
	($4\frac{5}{6}$ times 78)	377 *Ans.*

	A	*B*	*C*	*D*
a.	$84 \times 4\frac{3}{4}$	$96 \times 3\frac{5}{6}$	$96 \times 4\frac{3}{8}$	$84 \times 7\frac{3}{4}$
b.	$48 \times 5\frac{2}{3}$	$88 \times 6\frac{7}{8}$	$85 \times 3\frac{2}{5}$	$84 \times 8\frac{2}{3}$
c.	$70 \times 4\frac{3}{5}$	$96 \times 5\frac{7}{8}$	$80 \times 6\frac{4}{5}$	$84 \times 9\frac{5}{6}$

4. Multiply 84 by $24\frac{5}{6}$.

PROCESS

After finding $\frac{5}{6}$ of 84, multiply 84 by 4, placing the right-hand figure of the product in the ones' column, then multiply 84 by 2 tens, placing the right-hand figure of the product in the tens' column, etc.

	84
	$24\frac{5}{6}$
($\frac{1}{6}$ of 84)	14
	× 5
($\frac{5}{6}$ of 84)	70
(4 times 84)	336
(2 tens times 84)	168
($24\frac{5}{6}$ times 84)	2086 *Ans.*

	A	*B*	*C*
a.	$36 \times 21\frac{1}{2}$	$42 \times 33\frac{1}{3}$	$48 \times 23\frac{1}{4}$
b.	$75 \times 31\frac{1}{3}$	$84 \times 42\frac{1}{6}$	$96 \times 22\frac{1}{8}$
c.	$108 \times 15\frac{2}{3}$	$112 \times 24\frac{3}{4}$	$120 \times 32\frac{2}{5}$
d.	$180 \times 24\frac{4}{5}$	$132 \times 14\frac{5}{6}$	$144 \times 41\frac{3}{8}$
e.	$176 \times 34\frac{5}{8}$	$184 \times 26\frac{7}{8}$	$140 \times 35\frac{1}{7}$
f.	$140 \times 51\frac{2}{5}$	$116 \times 61\frac{3}{4}$	$170 \times 52\frac{3}{5}$
g.	$200 \times 62\frac{3}{8}$	$150 \times 71\frac{2}{3}$	$160 \times 81\frac{5}{8}$
h.	$130 \times 12\frac{4}{5}$	$240 \times 23\frac{7}{8}$	$306 \times 34\frac{5}{6}$

Sight Exercises

Give products:

A	*B*	*C*	*D*	*E*	*F*
60	60	40	50	50	50
$\times 10\frac{5}{6}$	$\times 10\frac{2}{3}$	$\times 10\frac{3}{4}$	$\times 10\frac{2}{5}$	$\times 10\frac{3}{5}$	$\times 10\frac{4}{5}$

Oral Problems

1. What is the cost of a yard of dress goods when one half yard costs 32 cents?

2. At 6 pairs of stockings for a dollar, how many pairs can be bought for $4.50?

3. When collars sell at 2 for 25 cents, what is received for a dozen collars?

4. How many tons of hay are there in two stacks, one containing $10\frac{1}{2}$ tons and the other containing $15\frac{1}{2}$ tons?

5. A man has two farms each containing 64 acres. How many acres are there in both?

6. A rod is $16\frac{1}{2}$ feet. How many feet wide is a road that is 2 rods wide?

7. At 60 cents a dozen, how much is paid for 36 roses?

8. How many are $5\frac{1}{2}+5\frac{1}{2}+5\frac{1}{2}$?

9. When each house is 20 feet wide, how many houses can be built on a plot 200 feet wide?

10. How many half-pint glasses of lemonade are there in 2 gallons?

11. One third of a flock of sheep are in the barn. How many are there in the flock if there are 32 sheep in the barn?

12. How many nails can be made from a yard of wire (*a*) when $\frac{1}{2}$ inch is needed for each nail? (*b*) When 2 inches are needed?

13. If a pail of water weighs 16 pounds and the pail alone weighs $2\frac{1}{2}$ pounds, how many pounds does the water weigh?

14. If $\frac{1}{2}$ peck of wheat weighs $7\frac{1}{2}$ pounds, what is the weight (*a*) of a peck? (*b*) Of 2 pecks? (*c*) Of 4 pecks?

15. A freight car can carry 100 thousand pounds. How many tons of 2 thousand pounds each can it carry?

16. A steel freight car weighs 22 tons of 2 thousand pounds each. How many pounds does it weigh?

17. Taking 1 pound as the weight of a pint of water, what is the weight of a 3-gallon pail of water, when the pail weighs 6 pounds?

18. At 25 cents a pound, how many pounds of coffee can be purchased (*a*) for \$1? (*b*) For \$2? (*c*) For \$4?

19. If a gallon of paint will cover 300 square feet, how many gallons are needed to paint 1,800 square feet?

20. At the rate of 3 pounds of flour to 4 pounds of bread, how many pounds of bread will 30 pounds of flour make?

21. If the dough weighs $\frac{3}{5}$ more than the flour, how many pounds of dough will 20 pounds of flour make?

22. The sum of 2 numbers is 60; one of the numbers is 26. What is the other?

Written Problems

1. What is the cost of a yard of cloth when one eighth of a yard costs 22 cents?

2. At 3 pairs of stockings for 50 cents, how many pairs can be bought for $3.50?

3. When cuffs sell at 2 pairs for 45 cents, what is received for a dozen pairs?

4. How many tons of hay are there in 3 stacks, containing, respectively, $10\frac{1}{4}$ tons, $12\frac{1}{2}$ tons, and $14\frac{1}{4}$ tons?

5. A farm consists of 3 fields each containing $36\frac{1}{2}$ acres. How many acres are there in the farm?

6. How many feet wide is a road 4 rods wide, a rod being 3 yards of $5\frac{1}{2}$ feet each?

7. At $1 per dozen, how much is paid for 66 roses?

8. How many are $16\frac{1}{2} + 16\frac{1}{2} + 16\frac{1}{2} + 16\frac{1}{2} + 16\frac{1}{2}$?

9. When each house is 25 feet wide, how many houses can be built on a plot 600 feet wide?

10. How many half-pint glasses of lemonade are there in 5 gallons?

11. One sixth of a flock of sheep are in the barn. How many sheep are there in the flock if there are 35 in the barn.

12. How many nails can be made from 5 yards of wire if $\frac{1}{2}$ inch is used in making each nail?

13. If a barrel with the flour weighs $220\frac{1}{2}$ pounds and the barrel weighs $24\frac{1}{2}$ pounds, how many pounds of flour does it contain?

14. When $\frac{1}{4}$ peck of potatoes weighs $3\frac{3}{4}$ pounds, find the weight of the potatoes in a barrel containing $2\frac{1}{2}$ bushels.

15. How many tons of 2,240 pounds each make 98,560 pounds?

16. How many pounds less than 44,000 does a car weigh that weighs 19 tons of 2,240 pounds each?

17. Assuming that a pint of water weighs a pound, what is the weight of a 40-quart can filled with water when the can weighs 25 pounds?

18. My bill for coffee at 25 cents per pound was \$ 11.25. How many pounds did I buy?

19. If a gallon of paint will cover 315 square feet, how many gallons will be needed to paint a fence containing 1,890 square feet?

20. At the rate of 3 pounds of flour to 4 pounds of bread, how many pounds of bread will 195 pounds of flour make?

21. If the dough weighs $1\frac{3}{5}$ times as much as the flour, how many pounds of dough will 195 pounds of flour make?

22. The sum of two numbers is 117. One of the numbers is 79. Find the other number.

23. What number multiplied by 32 gives a product of 480?

Denominate Numbers

Long Measure

12 inches (in.)	1 foot (ft.)
3 feet	1 yard (yd.)
$5\frac{1}{2}$ yards	1 rod (rd.)
320 rods	1 mile (mi.)

Oral Problems

1. How many houses, each 20 feet wide, can be built from First Street to Second Street if the building space is 200 feet?

2. What is the distance from the middle of First Street to the middle of Second Street if each street is 50 feet wide, the sidewalk on each street is 7 feet wide, and the building space is 200 feet?

3. How many houses, each 20 feet wide, can be built from Avenue A to Avenue B if the building space is 800 feet?

4. What is the distance from the middle of Avenue A to the middle of Avenue B if each avenue is 60 feet wide, the sidewalk on each avenue is 10 feet wide, and the building space is 800 feet?

5. What part of a mile is the length of a square field, if each side measures 80 rods?

6. How many feet are there in a rod?

7. If there are 20 streets to a mile, how far do you walk in going from 60th Street to 85th Street?

Written Problems

1. Fill the blanks in the following:

1 mi. = 320 rd. = — yd. = — ft.

1 rd. = $5\frac{1}{2}$ yd. = — ft.

2. When a man's pace measures 3 feet, how many paces are there in $\frac{1}{4}$ mile?

3. If a boy's pace is $2\frac{1}{2}$ feet, how many yards are equal to 120 paces?

4. When railroad ties are 4 feet apart, how many ties are there to a mile?

5. How many dollars will pay for 1,320 railroad ties at \$ $\frac{1}{4}$ each?

6. How many rails each 60 feet long will make a mile?

7. At 18 pounds to the yard, find the weight of one 60-foot rail.

8. Measure the length of a page of your book. Measure the length of the cover. Find the difference between the two lengths.

9. When streets are 264 feet apart how many streets are there to a mile?

10. When avenues are 880 feet apart, how many avenues are there to a mile?

11. How many miles does a person walk in going from Avenue A to Avenue I and from 18th Street to 33d Street?

Areas

Oral Exercises

1. (*a*) How many square inches are there in a square 2 inches long? (*b*) In a rectangle 2 inches long, $\frac{1}{2}$ inch wide? (*c*) In a rectangle $2\frac{1}{2}$ inches long, 2 inches wide?

2. How many square feet in a blackboard $8\frac{1}{2}$ feet long, 4 feet wide?

3. How many square feet in a door 6 feet high, $2\frac{1}{2}$ feet wide?

4. How many square feet in two windows each 5 feet high, $2\frac{1}{2}$ feet wide?

5. How many square yards in a floor 6 yards long, $4\frac{1}{2}$ yards wide?

6. How many square yards in a piece of carpet 36 yards long, $\frac{3}{4}$ yard wide?

7. How many square inches in a square 12 inches long, 12 inches wide? In a square 1 foot long, 1 foot wide?

8. How many square feet in a city lot (*a*) 20 feet by 100 feet? (*b*) 25 feet by 100 feet? (*c*) 30 feet by 150 feet?

9. How many square feet are there (*a*) in 4 city lots, each measuring 20 feet by 100 feet? (*b*) In 40?

10. There are 160 square rods in an acre. (*a*) How many square rods in 10 acres? (*b*) How many acres in a square field 40 rods long?

Written Exercises
Square Measure

144 square inches (sq. in.) 1 square foot (sq. ft.)
9 square feet 1 square yard (sq. yd.)

NOTE. To find the area in *square inches*, express each dimension in inches; to find the area in *square feet*, express each dimension in feet; to find the area in *square yards* express each dimension in yards.

1. Find the area of a rug 54 inches wide, 72 inches long.

The *number* of square inches $= 54 \times 72$.
The *number* of square feet $= 4\frac{1}{2} \times 6$.
The *number* of square yards $= 1\frac{1}{2} \times 2$.

2. Find the number of *square inches* in each of the following rectangles:

a. Length, 48 inches; width, 42 inches.
b. Length, 4 feet; width, 42 inches.
c. Length, 4 feet; width, $3\frac{1}{2}$ feet.

3. Find the number of *square feet* in each of the following rectangles:

a. Length, 4 feet; width, $3\frac{1}{2}$ feet.
b. Length, 54 feet; width, 60 inches.
c. Length, 120 feet; width, 25 feet.

4. Find the number of *square yards* in each of the following rectangles:

a. Length, 36 yards; width, $\frac{3}{4}$ yard.
b. Length, 108 feet; width, 27 inches.
c. Length, 48 yards; width, $37\frac{1}{2}$ yards.

Measurements

Written Problems

1. A room is 18 feet long, 12 feet wide, 9 feet high.

a. Find the number of square feet in the floor.

b. How many square yards of carpet will cover the floor?

c. Find the number of square feet in the ceiling.

d. How many running feet of baseboard are there in four sides of the room, deducting 3 feet for the space taken by a door?

e. How many square feet of baseboard are there in the room, when the baseboard is one foot high?

2. A paper cracker box is 8 inches long, 3 inches wide, 3 inches high.

a. How many square inches of paper are required for each of the square ends?

b. How many square inches of paper are required for each of the four long faces?

c. How many square inches of paper are required for all six faces, making no allowance for overlapping?

d. How many crackers 3 inches square will it hold, if each cracker is $\frac{1}{4}$ inch thick?

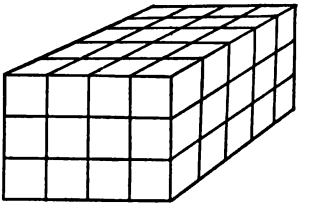
3. How many square feet of wall paper are there in a roll of paper 18 yards long, 18 inches wide?

4. At \$1.50 per square yard, what will be the cost of the linoleum covering a kitchen 15 feet square?

5. A fence on the front of a lot is 25 feet long and 6 feet high. How many square feet does it contain?

Cubical Contents

Preparatory Exercises



1. (*a*) How many one-inch cubes can be placed on the bottom of a box 5 inches long, 4 inches wide? (*b*) If the box holds 3 layers of one-inch cubes, how many one-inch cubes will the box hold?

2. A box 6 inches long, $5\frac{1}{2}$ inches wide, and 7 inches high will hold exactly a gallon. How many cubic inches are there in a gallon?

3. How many one-inch cubes can be put into a cracker box 3 inches by 3 inches by 8 inches?

4. Carefully balance an empty pint measure by placing sand on the opposite pan of the scales, then fill the measure with water and ascertain the weight of the water.

5. (*a*) Find the number of cubic inches in a cube 12 inches long, 12 inches wide, 12 inches high. (*b*) How many cubic feet does it contain? (*c*) How many cubic inches are there in a cubic foot?

6. (*a*) How many cubic feet are there in a cube 3 feet long, 3 feet wide, 3 feet high? (*b*) How many cubic feet are there in a cubic yard?

7. Give the capacity of a bin measuring, on the inside, 2 yards long, 2 yards wide, 2 yards high.

Volumes

To find the *volume* of a solid means to find the number of cubic inches, cubic feet, cubic yards, etc., it contains.

A solid having six rectangular faces is called a *rectangular prism.* The opposite faces of a rectangular prism are equal in area. When each of the six faces is a square, the solid is called a cube.

A caramel is a rectangular prism, so is a brick, a box, a room, etc.

A rectangular prism has three *dimensions;* length, width, and thickness.

To find the *number* of cubic inches, cubic feet, cubic yards, etc., in a rectangular prism, multiply the number of inches, feet, yards, etc., in its length, by the number of the same denomination in its width, and this product by the number of the same denomination in its thickness.

Table

Cubic Measure

1728 cubic inches (cu. in.)	1 cubic foot (cu. ft.).
27 cubic feet	1 cubic yard (cu. yd.).

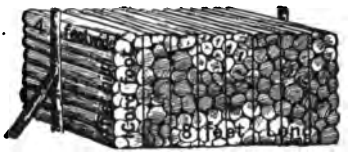
---

1 cubic foot = $7\frac{1}{2}$ gallons (nearly).

1 cubic foot = $\frac{4}{5}$ bushel (nearly).

Written Exercises

1. How many cubic feet are there in a pile of wood 8 feet long, 4 feet wide, 4 feet high?



NOTE. A pile of wood 8 ft. by 4 ft. by 4 ft. contains a *cord.*

2. How many cubic feet of grain can be placed in a bin 5 feet long, 5 feet wide, 5 feet high?

3. At $\frac{4}{5}$ bushel to the cubic foot, how many bushels are there in 125 cubic feet?

4. A cubic foot of water weighs 1,000 ounces. How many pounds does it weigh?

5. At $62\frac{1}{2}$ pounds to the cubic foot, what is the weight of 128 cubic feet of water?

6. At $31\frac{1}{4}$ pounds to the cubic foot, what is the weight of a cord of wood (128 cu. ft.)?

7. If a cart body is 4 feet long and 3 feet wide, how high must it be to hold 27 cubic feet?

8. When dry sand weighs 86 pounds to the cubic foot, what is the weight of a cart load containing 22 cubic feet?

9. How many cubic feet are there in a wagon body 6 feet long, $4\frac{1}{2}$ feet wide, $1\frac{1}{3}$ feet high?

10. What is the weight of a cubic yard of sand weighing 86 pounds to the cubic foot?

11. How many cubic yards are there in a box 2 yards long, $1\frac{1}{2}$ yards wide, $\frac{1}{2}$ yard high?

12. How many cubic feet are there in $1\frac{1}{3}$ cubic yards?

13. At $7\frac{1}{2}$ gallons to a cubic foot, how many gallons of water will fill a tank 8 feet long, 4 feet wide, 4 feet high?

14. How many cubic feet of earth are removed in digging a cellar 50 feet long, 20 feet wide, and 9 feet deep?

15. How many cubic yards of air are there in a room 18 feet long, 12 feet wide, and 9 feet high?

16. (*a*) How many cubic feet are there in a timber 16 feet long, 6 inches wide, 3 inches thick? (*b*) what is its weight at 40 pounds to the cubic foot?

SECTION IV

REVIEW AND SUPPLEMENTARY WORK

Notation and Numeration

For convenience in reading large numbers divide them by commas into periods of three figures each, beginning at the right.

TABLE

Hundreds	Tens	Ones	Hundreds	Tens	Ones	Hundreds	Tens	Ones
1	2	3,	4	5	6,	7	8	9
Millions' Period			Thousands' Period			Ones' Period		

In reading numbers omit the name of the ones' period. Read 789, seven hundred eighty-nine.

Read 6,789, 6 thousand 789.

Read 3,456,789, 3 million 456 thousand 789.

The periods above the third are named *billions'* period, *trillions'* period, etc.

Omit the name of a period consisting exclusively of ciphers. Thus, read 14,000,000 as 14 million; 6,000,375 as 6 million 375.

Do not use a comma in writing a number of four figures denoting a year.

Numbers of four figures are frequently read as hundreds; as, 19 hundred 10. The word *hundred* is also omitted; as, nineteen ten.

Oral Exercises

Read the following:

	A	*B*	*C*	*D*
a.	250,000	1,205,060	23,004,005	103,206,580
b.	173,086	789,516	3,000,486	215,387,614
c.	45,297	2,314,800	28,000,000	319,600,000
d.	6,050	6,519,260	36,050,000	48,600,000
e.	23,915	800,000	5,060,000	562,009,007
f.	456,808	3,465,292	45,103,950	643,870,530

Written Exercises

Express in figures:

1. Three hundred seventy-two thousand.

2. One million, forty-two thousand, six hundred.

3. Ten million, fifty thousand, seventy.

4. One hundred seventy-five million, two hundred three thousand, six hundred.

5. Eighty-four million, seven hundred twenty-two thousand, three hundred ninety-five.

6. Two million, five thousand, three.

7. One hundred six million, three hundred ten thousand, eight.

8. Nine hundred eighty-seven million, six hundred fifty-four thousand, three hundred twenty-one.

9. Five hundred million, two thousand, one.

10. Seven hundred eighty-five million, two hundred forty-four thousand, nine hundred fifty-six.

Addition and Subtraction

Sight Drills

1. Add 128 to each of the following numbers:

	A	*B*	*C*	*D*	*E*	*F*	*G*	*H*	*I*	*J*
a.	93	26	92	66	84	74	96	15	87	78
b.	64	57	36	44	38	53	28	67	91	86
c.	46	34	83	25	77	88	56	85	76	37
d.	82	18	65	14	45	95	73	27	14	55
e.	25	73	47	58	98	17	35	68	94	48

2. Subtract each of the foregoing numbers from 210.

3. Add 350 to each of the following numbers:

	A	*B*	*C*	*D*	*E*	*F*
a.	190	125	56	1,050	2,700	155
b.	270	216	67	2,060	3,800	256
c.	350	137	78	3,070	4,900	357
d.	480	325	89	4,080	5,800	458
e.	560	445	95	5,090	6,700	559

4. Give answers rapidly:

Think $221 + 100 + 50 + 6$. Think $221 - 100 - 50 - 6$.

	A	*B*	*C*
a.	$221 + 156$	$422 - 363$	$362 + 284$
b.	$221 - 156$	$540 + 451$	$362 - 284$
c.	$334 + 245$	$540 - 451$	$273 + 175$
d.	$334 - 245$	$431 + 362$	$273 - 175$
e.	$422 + 363$	$431 - 362$	$184 + 122$

Addition and Subtraction

Written Exercises

1. Find sums. Test:

	A	*B*	*C*
a.	612,345	2,543,876	37,873,887
	89,764	264,668	6,525,307
	7,652	4,828,748	895,400
	98,030	402,606	67,859
	204,786	90,090	242,784
	88,359	825,163	68,135
b.	842,735	7,369,644	78,642,371
	94,681	377,180	1,945,852
	27,658	92,143	647,481
	248,569	869,515	25,635
	60,370	4,625,790	847,162
	85,396	608,405	3,836,505
c.	714,653	6,833,726	2,439,876
	94,728	188,706	60,400
	615,840	548,057	294,501
	53,174	64,382	804,975
	58,034	1,008,590	2,800,463
	65,348	438,249	858,674

2. Find differences without rearranging:

−83,604	−890,089	45,305,902
600,000	1,234,567	−7,408,904

3. Add:

	A	*B*	*C*
a.	$123,456.78	$ 94,309.82	$767,088.00
	90,312.20	172,074.55	126,435.79
	6,734.87	99,873.00	205,719.65
	539,314.60	67,021.45	80,482.36
	619,512.14	216,835.50	198,060.00
b.	$854,923.74	$270,050.66	$820,932.32
	45,024.58	382,104.20	88,150.08
	7,056.00	92,307.55	26,934.45
	304,729.68	81,256.43	342,345.00
	51,120.09	507,759.00	6,437.46
c.	$ 82,559.24	$895,694.63	$450,880.77
	76,385.64	96,438.00	57,028.24
	371,626.00	42,740.08	96,462.50
	27,842.96	138,128.72	792,664.82
	381,730.53	69,569.06	48,125.82
	78,473.75	70,591.76	38,484.57

4. Insert missing addend:

	A	*B*	*C*
a.	$157,943.87	?	$345,678.90
	+ ?	+ $983,654.63	+ ?
	$200,000.00	$1,000,000.00	$1,234,567.89
b.	$ 82,559.24	$895,694.63	?
	76,385.64	?	$ 450,880.77
	?	96,438.00	792,664.23
	$200,000.00	$1,000,000.00	$1,234,567.89

Multiplication and Division

Drill Exercises

1. Give products:

Say twice two ten are four twenty, four times six ten are twenty-four forty. Omit the words *hundred* and *thousand.*

	A	*B*	*C*	*D*
a.	2 × 210	3 × 210	4 × 210	5 × 210
b.	2 × 310	3 × 310	4 × 310	5 × 310
c.	2 × 410	3 × 410	4 × 410	5 × 410
d.	2 × 510	3 × 510	4 × 510	5 × 510
e.	2 × 610	3 × 610	4 × 610	5 × 610

	E	*F*	*G*	*H*
a.	6 × 210	7 × 210	8 × 210	9 × 210
b.	6 × 310	7 × 310	8 × 310	9 × 310
c.	6 × 410	7 × 410	8 × 410	9 × 410
d.	6 × 510	7 × 510	8 × 510	9 × 510
e.	6 × 610	7 × 610	8 × 610	9 × 610

2. Give quotients and remainder, if any:

Think two ten into fourteen seventy, etc.

	A	*B*	*C*	*D*
a.	210)1,470	210)1,890	210)1,260	210)1,680
b.	310)1,550	310)2,480	310)1,860	310)2,180
c.	410)3,700	410)1,640	410)2,500	410)2,050
d.	510)2,040	510)3,670	510)1,540	510)4,600
e.	610)5,500	610)1,830	610)3,070	610)4,880
f.	710)5,000	710)1,430	710)6,400	710)5,680

Oral Problems

1. A man went from New York to Baltimore, 184 miles, and then from Baltimore to Washington, 40 miles. How far did he travel from New York to Washington?

2. At 32 miles per hour how long would it take a train to go 960 miles?

3. What is the weight of 40 bushels of oats at 32 pounds to the bushel?

4. Twelve hundred eighty pounds are how many pounds less than twenty hundred pounds?

5. At 320 rods to the mile, how many rods are there in 4 miles?

6. How many working days are there in a year of 365 days, excluding 52 Sundays and 4 holidays?

7. How many $\frac{1}{4}$-acre plots are there in a piece of ground containing 16 acres?

8. If a man walks $2\frac{1}{2}$ miles to his work and $2\frac{1}{2}$ miles back, how many miles does he walk in a year of 309 working days in going to work and returning?

9. How many square feet are there in a tight fence 6 feet high around a square plot, each side measuring 200 feet?

10. Find how much less than \$100 will be the cost of 80 hammocks at \$1.10 each.

11. How much change is given when a \$20 bill is given for a purchase of \$18.40?

Multiplication

Written Exercises

Multiply. Test:

	A	*B*	*C*
a.	415 × 306	1,205 × 308	1,504 × 1,307
b.	421 × 509	1,307 × 345	1,498 × 1,406
c.	123 × 876	1,406 × 403	1,234 × 4,301
d.	234 × 543	1,508 × 512	1,407 × 2,048
e.	316 × 435	2,042 × 332	2,305 × 1,352
f.	423 × 316	2,105 × 623	1,234 × 1,234
g.	538 × 243	3,016 × 712	1,357 × 2,468
h.	641 × 165	4,204 × 805	1,536 × 1,243
i.	812 × 143	1,234 × 916	2,135 × 1,354
j.	924 × 122	1,345 × 821	3,216 × 1,234
k.	844 × 137	2,123 × 777	2,123 × 2,331
l.	763 × 204	3,214 × 666	3,214 × 1,332
m.	627 × 212	4,125 × 555	4,125 × 1,665
n.	586 × 423	1,326 × 987	1,263 × 4,164
o.	437 × 514	2,314 × 876	2,143 × 2,468
p.	359 × 625	3,245 × 765	3,425 × 1,357
q.	286 × 713	4,216 × 654	4,162 × 2,579
r.	175 × 826	5,135 × 543	5,531 × 3,467
s.	298 × 735	4,424 × 432	4,244 × 4,253
t.	367 × 642	3,571 × 321	3,157 × 3,275
u.	406 × 457	2,809 × 246	4,356 × 2,345
v.	584 × 318	1,763 × 357	2,824 × 3,609

Long Division

Written Exercises

1. Divide. Test:

	A	*B*	*C*	*D*
a.	9,177 ÷ 19	9,432 ÷ 18	9,129 ÷ 17	9,120 ÷ 16
b.	9,773 ÷ 29	9,660 ÷ 28	9,828 ÷ 27	9,378 ÷ 26
c.	9,555 ÷ 39	8,968 ÷ 38	9,259 ÷ 37	9,259 ÷ 36
d.	9,163 ÷ 49	8,400 ÷ 48	9,071 ÷ 47	9,062 ÷ 46
e.	9,617 ÷ 59	9,106 ÷ 58	9,519 ÷ 57	9,516 ÷ 56
f.	8,832 ÷ 69	9,044 ÷ 68	9,916 ÷ 67	9,900 ÷ 66
g.	5,925 ÷ 79	5,148 ÷ 78	9,625 ÷ 77	9,662 ÷ 76
h.	7,298 ÷ 89	6,864 ÷ 88	7,569 ÷ 87	7,568 ÷ 86
i.	6,237 ÷ 99	8,134 ÷ 98	9,894 ÷ 97	9,984 ÷ 96

2. Divide. Test:

	A	*B*	*C*
a.	8,159 ÷ 199	61,854 ÷ 793	608,006 ÷ 634
b.	9,536 ÷ 298	47,276 ÷ 892	472,515 ÷ 545
c.	9,131 ÷ 397	33,694 ÷ 991	336,528 ÷ 456
d.	7,936 ÷ 496	58,565 ÷ 901	585,365 ÷ 367

3. Divide. Test:

	A	*B*
a.	974,036 ÷ 1,204	1,522,756 ÷ 1,234
b.	827,431 ÷ 2,033	4,704,070 ÷ 2,345
c.	925,344 ÷ 3,024	9,381,372 ÷ 3,124
d.	953,428 ÷ 4,006	8,417,040 ÷ 4,126
e.	903,060 ÷ 5,017	5,548,040 ÷ 5,234

Oral Problems

1. A gross is 12 dozen. How many pencils (*a*) in $\frac{1}{2}$ gross? (*b*) In $\frac{1}{3}$ gross? (*c*) In $\frac{3}{4}$ gross? (*d*) In $\frac{1}{4}$ gross?

2. How many quarts of oil are there in a barrel containing 51 gallons?

3. From a farm of 300 acres, 261 acres were sold. How many acres were not sold?

4. How many quarter-dollars are there in $22?

5. Mr. Alphin sets out 88 hundred cabbage plants in 44 rows. How many plants are there in each row?

6. If a wagon weighs 12 hundred pounds and the straw on it weighs 22 hundred pounds, what is the weight of both?

7. From a barrel of oil containing 50 gallons $10\frac{1}{2}$ gallons were sold. How many gallons remain?

8. How many days (*a*) in 50 weeks? (*b*) In 2 weeks? (*c*) In 52 weeks?

9. How many dollars are there in 888 quarter dollars?

10. How many days will 48 pounds of butter last if 16 pounds are used in a week?

11. If a man earns $125 per month and his expenses are $94 per month, how many dollars can be saved (*a*) in a month? (*b*) In a year?

12. What is the weight of 1,000 common bricks at $1\frac{1}{2}$ lb. each?

13. At 160 bricks per day, how many days are required to lay 960 bricks?

14. What is the cost of a cement walk 3 feet wide, 100 feet long, at 8 cents per square foot?

15. A man takes an automobile trip 40 miles and back at the rate of 8 miles per hour going, and 10 miles per hour returning. How long does he require for the trip?

16. I bought 20 yards of velvet for $70 and sold it at a profit of $\$\frac{1}{2}$ per yard. How much per yard did I receive for it?

17. Two boys start from the same point and travel in opposite directions at the rate of $2\frac{1}{2}$ miles per hour. How far apart are they in 5 hours?

18. What is the cost of a horse and a wagon if the horse cost $250 and the wagon cost $125?

19. A field is 300 yards square. How many yards of wire will be required to inclose it with a fence 4 wires high?

20. A man bought a lot for $650, giving 12 cows, for which he was allowed $50 each, and the balance in cash. How much cash did he give?

21. After selling one half of his crop of cotton Judge Wilson has 324 bales left. Of how many bales did the crop consist?

22. A boy used 224 of a bunch of 250 shingles in mending a roof. How many shingles were left?

Written Problems

1. A great gross consists of 12 gross of 12 dozen each. How many pens are there in one half of a great gross?

2. How many quarts of oil are there in 49 gallons?

3. From a farm of 300 acres $137\frac{3}{4}$ acres were sold. How many acres remain?

4. How many quarter dollars are there in $\$27\frac{1}{2}$?

5. If 9,180 cabbage plants are required for 45 rows, how many plants are there to a row?

6. A wagon weighs 1,245 lb. and the straw on it weighs 2,156 lb. What is the weight of both?

7. From a barrel of oil containing 50 gallons, three lots were sold of $10\frac{1}{2}$ gallons each. How many gallons remain?

8. How many days are there in 26 weeks?

9. How many dollars are there in 972 quarter dollars?

10. How many days will 255 pounds of butter last if 17 pounds are used each week?

11. If a man earns \$ 112.50 per month and his expenses are \$ 83.75 per month, how many dollars can he save in (*a*) 1 month? (*b*) 1 year? (*c*) 2 years?

12. A girl makes a steamboat trip of 100 miles and back at the rate of 16 miles per hour going and 12 miles per hour returning. How many hours are required for the round trip?

13. What is the weight of 960 common bricks at $1\frac{1}{2}$ pounds each?

14. At 160 bricks per day, how many days are required to lay 4,000 bricks?

15. At 10 cents per square foot, what is the cost of a cement walk 5 feet wide, 164 feet long?

16. A dealer bought 32 yards of cloth for $80 and sold it at a profit of $\$\frac{3}{4}$ per yard. How much did he receive for it per yard?

17. Two boys start from the same point and travel in opposite directions, each going at the rate of $2\frac{3}{4}$ miles per hour. How far apart are they in 8 hours?

18. What is the cost of a horse, a wagon, and a set of harness, if the horse cost $375, the wagon $150, and the harness $35?

19. A field is 256 yards square. How many yards of wire will inclose it with a fence 4 wires high?

20. A man bought a lot for $800, giving 12 cows at the rate of $55 each and the remainder in cash. How much cash did he give?

21. After selling three fourths of his crop of hay Mr. Whitlock has 123 tons left. How many tons were there in the crop?

22. A boy uses 787 shingles out of 4 bunches of 250 shingles each. How many shingles are left?

23. How many tons of 2,240 pounds each do 1,600 paving bricks weigh if a brick weighs 7 pounds?

Aliquot Parts of Dollar

Oral Exercises

1. How many dollars are equal to 44 half dollars?

2. What is the cost of 2 dozen baseballs at $\$\frac{1}{2}$ each?

3. How much must be paid for 48 yards of dress goods at 50 cents per yard?

4. A girl has saved 12 dollars and 12 half dollars. How much has she saved?

5. Find the cost of 2 dozen straw hats at $\$1\frac{1}{2}$ each.

6. A man cut down 64 trees, each yielding $1\frac{1}{2}$ cords of wood. How many cords of wood did he cut?

7. What will be received for cutting 64 cords of wood at $\$1\frac{1}{2}$ per cord?

8. At 25 cents per dozen, what is received for 48 dozen eggs?

9. What is the yearly cost of a newspaper at 25 cents per month?

10. At 25 cents each, what is the cost of 88 readers?

11. When meat is 25 cents per pound, how much does the butcher receive for 168 pounds?

12. If 4 pairs of cuffs cost a dollar, how many pairs can be bought for $\$42$?

13. At 4 for a dollar, how many baseballs can be bought for $\$12$?

14. How many 50-cent baseballs will cost $\$24$?

Sight Exercises

1. Give the cost of each of the following items:

a. 120 yards of silk @ $1.50 per yard.
$120 + ½ of $120.

b. 248 gallons of sirup @ 50 cents per gallon.
248 half dollars.

c. 484 pounds of coffee @ 25 cents per pound.
484 quarter dollars.

d. 620 bushels of apples @ $1.50 per bushel.

e. 840 handkerchiefs @ 25 cents each.

f. 360 pairs of socks @ 25 cents per pair.

g. 168 baseballs @ 50 cents each.

h. 440 penknives @ $1.50 each.

i. 120 gallons of oil @ 16 cents per gallon.
16 times 120.

j. 210 pounds of sugar @ 6 cents per pound.

k. 320 yards of velvet @ $3 per yard.

l. 24 carpet rugs @ $20 each.

m. 180 dozen collars @ $1.50 per dozen.

n. 44 bushels of wheat @ $1.02 per bushel.
44 times $1.02.

o. 110 barrels of flour @ $6 per barrel.

p. 15 horses @ $300 each.

q. 2 automobiles @ $2,400 each.

r. 200 acres of land @ $40 per acre.

s. 488 pounds of butter @ 25 cents per pound.

t. 620 geranium plants @ 4 cents each.

Cancellation

Preparatory Exercises

1. (*a*) How many pigs at \$7 each will pay for 27 cows at \$35 each? (*b*) How many pigs at \$7 each will pay for 28 cows at \$34 each?

A LONG METHOD

In (*a*) the value of the cows is 27 times \$35, or \$945. The quotient of \$945 by \$7 gives 135 as the number of pigs.

(*a*)
$$\begin{array}{r} \$35 \\ \times 27 \\ \hline 245 \\ 70 \\ \hline \$7)\$945 \end{array}$$

Ans. 135 (pigs)

Find the answer to (*b*) by this method.

Examples involving only multiplication and division can sometimes be shortened by cancellation.

A SHORTER METHOD

In (*a*) indicate the product of 35 by 27, by placing the multiplication sign (×) between them. Indicate that this product is to be divided by 7 by writing the latter under a line drawn below the former. Divide 35 by 7, canceling both, and writing the quotient 5 above the former. The product of 5 and 27 is the number of pigs, 135.

$$\frac{35 \times 27}{7}$$

$$\frac{\overset{5}{\cancel{35}} \times 27}{\underset{1}{\cancel{7}}} = 135 \text{ (pigs)} \quad \textit{Ans.}$$

Find the answer to (*b*) by this method.

Written Problems

1. How many pounds of sugar at 6 cents a pound will pay for 15 pounds of butter at 24 cents a pound?

2. How many pounds of butter at 25 cents a pound will pay for 75 pounds of sugar at 6 cents a pound?

3. If 13 men require 17 days to do a piece of work, how long would it take 39 men to do it?

4. If 14 men require 19 days to do a piece of work, how long would it take 38 men to do it?

5. When 135 bushels of corn are raised on 3 acres, how many bushels should be raised on 7 acres at the same rate?

6. When a 6-acre field yields 95 bushels of wheat, what should be the yield of an 18-acre field?

7. When 18 acres yield 276 bushels of wheat, what should be the yield of 6 acres?

8. How many yards at 18 cents per yard will pay for 21 pounds of butter at 24 cents per pound?

PROCESS

Indicate the product of 24 (¢) by 21 and the quotient of this result by 18. Divide 18 and 24 by 6, canceling both, and writing the respective quotients 3 and 4. Cancel 3 and 21, writing the quotient 7. Write the product of 4 and 7 as the number of yards.

$$\frac{\overset{7}{\cancel{21}} \times \overset{4}{\cancel{24}}}{\underset{3}{\cancel{18}}} = 28 \text{ (yd.)}$$

9. How many pounds of pork at 15 cents a pound can be exchanged for 27 bushels of potatoes at 50 cents per bushel?

10. If 16 men require 15 days to dig a ditch, how many days would it take 12 men to do it?

11. If 16 men can do a piece of work in 18 days, how many men would be needed to do it in 12 days?

12. If 16 men require 20 days to do a piece of work, how many days would it take 15 men to do it?

PROCESS

Indicate the time required by 1 man, 16 times 20 days; and the quotient of this product by 15 as the time needed by 15 men. Divide 15 and 20 by 5, canceling both, and writing the respective quotients 3 and 4. Write the product of 16 by 4 above a line and 3 underneath it, making the improper fraction $\frac{64}{3}$, which is reduced to $21\frac{1}{3}$, the number of days.

$$\frac{16 \times \overset{4}{\cancel{20}}}{\underset{3}{\cancel{15}}} = \frac{64}{3} = 21\tfrac{1}{3} \text{ (da.)}$$

13. How many dozen of eggs at 33 cents per dozen will pay for 22 pounds of ham at 20 cents per pound?

14. At 60 pounds to the bushel, how many bushels of clover seed are there in 7 bags weighing 150 pounds each?

15. At the rate of 370 miles in 20 hours, how many miles would a freight train go in 15 hours?

Relation of Numbers

Preparatory Exercises

1. Find $\frac{1}{2}$ of each of the following numbers:
   a. 24. *b.* 48. *c.* 62. *d.* 86. *e.* 50. *f.* 70.

2. Find $\frac{1}{4}$ of each of the following numbers:
   a. 24. *b.* 36. *c.* 48. *d.* 84. *e.* 64. *f.* 96.

3. Find $\frac{1}{3}$ of each of the following numbers:
   a. 18. *b.* 24. *c.* 36. *d.* 48. *e.* 69. *f.* 96.

4. Find $\frac{3}{4}$ of each of the following numbers:
   a. 16. *b.* 20. *c.* 32. *d.* 40. *e.* 48. *f.* 80.

5. Find $\frac{2}{3}$ of each of the following numbers:
   a. 15. *b.* 21. *c.* 33. *d.* 63. *e.* 90. *f.* 96.

6. What fraction of 60 is each of the following:
   a. 30? *b.* 20? *c.* 15? *d.* 12? *e.* 24? *f.* 40?

7. What fraction of 48 is each of the following:
   a. 8? *b.* 16? *c.* 24? *d.* 12? *e.* 36? *f.* 32?

8. What fraction of a foot is each of the following:
   a. 2 in.? *b.* 3 in.? *c.* 4 in.? *d.* 5 in.?
   e. 6 in.? *f.* 7 in.? *g.* 8 in.? *h.* 9 in.?
   i. 1 in.? *j.* 12 in.? *k.* 10 in.? *l.* 11 in.?

9. What fraction of a pound is each of the following:
   a. 1 oz.? *b.* 2 oz.? *c.* 3 oz.? *d.* 4 oz.?
   e. 5 oz.? *f.* 6 oz.? *g.* 7 oz.? *h.* 8 oz.?
   i. 9 oz.? *j.* 10 oz.? *k.* 11 oz.? *l.* 12 oz.?
   m. 13 oz.? *n.* 14 oz.? *o.* 15 oz.? *p.* 16 oz.?

10. What fraction of 24 is:

a. 1? *b.* 5? *c.* 7? *d.* 11?
e. 13? *f.* 17? *g.* 19? *h.* 23?

11. What fraction of 24, in lowest terms, is:

a. 20? *b.* 9? *c.* 15? *d.* 21?
e. 10? *f.* 14? *g.* 22? *h.* 18?

12. Find the number whose one-half is:

a. 10. *b.* 15. *c.* 20. *d.* 25. *e.* 30. *f.* 40.

13. Find the number whose one-fourth is:

a. 10. *b.* 12. *c.* 21. *d.* 25. *e.* 31. *f.* 42.

14. Find the number whose one-third is:

a. 12. *b.* 13. *c.* 15. *d.* 16. *e.* 21. *f.* 32.

15. Find 2 thirds of a number when 1 third is:

a. 10. *b.* 11. *c.* 14. *d.* 24. *e.* 33. *f.* 44.

16. Find 1 third of a number when 2 thirds are:

a. 22. *b.* 30. *c.* 36. *d.* 44. *e.* 60. *f.* 80.

17. Find 3 thirds of a number when 2 thirds are:

a. 22. *b.* 30. *c.* 36. *d.* 44. *e.* 60. *f.* 80.

18. Find 4 fourths of a number when 3 fourths are:

a. 12. *b.* 18. *c.* 24. *d.* 30. *e.* 60. *f.* 90.

19. Find the number when 4 thirds are:

a. 12. *b.* 16. *c.* 32. *d.* 40. *e.* 48. *f.* 84.

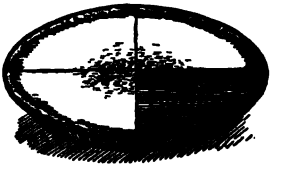
20. Find the number when 4 fifths are:

a. 12. *b.* 16. *c.* 32. *d.* 40. *e.* 48. *f.* 84.

Oral Problems

1. If $\frac{1}{2}$ pound of butter costs 12 cents, what is the price of a quarter of a pound?

2. If one half of a pie costs 10 cents, what is the price of a quarter of a pie?



3. If a girl paid 15 cents for 3 quarters of a pie, what was the price of each quarter?

4. How is the price of a quarter of a yard found when you know the price of a half yard to be 20 cents?

5. How is the price of 1 fourth of a pie found, when you know the price of 3 fourths to be 15 cents?

6. When 2 equal parts of a number are 60, what is each of the equal parts?

7. When 3 of the equal fields of a farm contain 60 acres, how many acres are there in each?

8. If 3 fourths of a number is 12, (*a*) what is 1 fourth of the number? (*b*) What is the number?

9. If 2 thirds of a yard of goods cost 22 cents, what will 3 thirds of a yard cost?

10. If 9 in. of wire cost 18¢, what will 12 in. cost?

11. If 3 fourths of a foot of wire cost 12 cents, what will 4 fourths of a foot cost?

12. Find the cost of a gallon of oil when 3 quarts cost 12 cents.

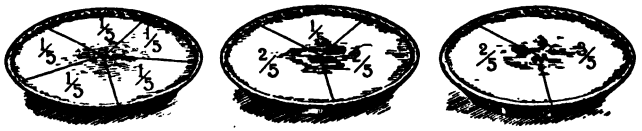
Fractions

A fraction is one or more of the equal parts into which a thing is divided.

A fraction consists of two numbers, called the *terms* of the fraction, one written above the other with a line between them.

When an apple, a pie, a number, etc., is divided into *two* equal parts, each part is called a *half;* when it is divided into *three* equal parts, each part is called a *third;* etc.

One half, one third, one fourth, etc., are written: $\frac{1}{2}$, $\frac{1}{3}$, $\frac{1}{4}$, etc.



If a pie, for instance, is divided into five equal parts, one of these parts is called one fifth; a portion equal in size to two of these parts is called two fifths; a portion equal in size to three of these parts is called three fifths; etc.

The number written below the line is called the *denominator* of the fraction; it shows into how many parts a thing is supposed to be divided. The number written above the line is called the *numerator;* it shows the number of these parts that are taken.

A fraction indicates division: the numerator being the dividend and the denominator the divisor.

Proper and Improper Fractions

A *proper* fraction is a fraction in which the number expressing the numerator is smaller than the number expressing the denominator; an *improper* fraction is one in which the number expressing the numerator is at least as large as the number expressing the denominator.

$\frac{1}{2}$, $\frac{2}{3}$, $\frac{4}{5}$, $\frac{7}{8}$, etc., are proper fractions.

$\frac{3}{3}$, $\frac{4}{3}$, $\frac{11}{5}$, $\frac{16}{8}$, etc., are improper fractions.

A *mixed number* is a whole number and a proper fraction written together.

$1\frac{1}{2}$, $3\frac{2}{3}$, $19\frac{7}{8}$, etc., are mixed numbers.

An improper fraction may be reduced to a whole or to a mixed number by dividing the numerator of the fraction by the denominator.

$$\frac{16}{2} = 8 \qquad \frac{17}{4} = 4\frac{1}{4} \qquad \frac{27}{8} = 3\frac{3}{8}$$

Sight Exercises

1. Change to whole or to mixed numbers:

	A	*B*	*C*	*D*	*E*
a.	$\frac{17}{2}$	$\frac{23}{5}$	$\frac{49}{8}$	$\frac{66}{11}$	$\frac{48}{16}$
b.	$\frac{16}{3}$	$\frac{25}{6}$	$\frac{72}{9}$	$\frac{25}{12}$	$\frac{71}{20}$

2. Change to improper fractions:

	A	*B*	*C*	*D*	*E*
a.	$8\frac{1}{2}$	$4\frac{1}{10}$	$3\frac{2}{5}$	$2\frac{3}{25}$	$3\frac{1}{6}$
b.	$5\frac{1}{3}$	$6\frac{1}{4}$	$3\frac{1}{2}$	$1\frac{8}{15}$	$4\frac{3}{25}$

Lowest Terms

A change in the form of a fraction that does not alter its value is called a *reduction.*

A fraction is reduced to *lowest terms* by dividing the numerator and the denominator by the largest number that will exactly divide both terms.

Sight Exercises

Reduce to lowest terms:

	A	*B*	*C*	*D*	*E*
a.	$\frac{2}{8}$	$\frac{2}{6}$	$\frac{2}{10}$	$\frac{2}{20}$	$\frac{2}{16}$
b.	$\frac{4}{8}$	$\frac{4}{6}$	$\frac{4}{10}$	$\frac{4}{20}$	$\frac{4}{16}$
c.	$\frac{6}{9}$	$\frac{6}{16}$	$\frac{6}{20}$	$\frac{6}{24}$	$\frac{6}{18}$
d.	$\frac{12}{16}$	$\frac{16}{24}$	$\frac{20}{25}$	$\frac{18}{30}$	$\frac{15}{18}$

Higher Terms

A fraction is changed to *higher terms* by multiplying both terms by the same number.

Sight Exercises

1. Change $\frac{1}{2}$ to 4ths. To 8ths. To 24ths.
2. Change $\frac{1}{3}$ to 6ths. To 9ths. To 15ths.
3. Change $\frac{2}{3}$ to 6ths. To 9ths. To 18ths.
4. Change $\frac{3}{4}$ to 8ths. To 16ths. To 24ths.
5. Change $\frac{5}{6}$ to 12ths. To 24ths. To 30ths.
6. Change $\frac{3}{8}$ to 16ths. To 24ths. To 40ths.
7. Change $\frac{5}{8}$ to 16ths. To 24ths. To 40ths.
8. Change $\frac{2}{5}$ to 10ths. To 20ths. To 30ths.

Common Denominators

To add or to subtract fractions, they must have the same denominator. When two or more fractions are changed to equivalent fractions each having the same denominator, they are said to be reduced to a *common denominator.*

Sight Exercises

1. Reduce each set to fractions having a common denominator:

	A	*B*
a.	$\frac{1}{2}, \frac{1}{3}, \frac{1}{4}$	$\frac{1}{2}, \frac{3}{4}, \frac{7}{10}$
b.	$\frac{1}{3}, \frac{1}{4}, \frac{1}{6}$	$\frac{1}{2}, \frac{2}{3}, \frac{3}{10}$
c.	$\frac{1}{2}, \frac{1}{4}, \frac{1}{5}$	$\frac{1}{2}, \frac{5}{6}, \frac{1}{10}$
d.	$\frac{1}{2}, \frac{1}{3}, \frac{1}{8}$	$\frac{2}{3}, \frac{3}{5}, \frac{1}{6}$

2. Find sums:

Reduce improper fractions in results to mixed numbers.

	A	*B*	*C*
a.	$\frac{1}{2}+\frac{1}{3}$	$\frac{1}{2}+\frac{1}{5}$	$\frac{1}{3}+\frac{2}{5}$
b.	$\frac{1}{3}+\frac{1}{4}$	$\frac{1}{3}+\frac{1}{5}$	$\frac{2}{3}+\frac{1}{5}$
c.	$\frac{1}{2}+\frac{2}{3}$	$\frac{1}{2}+\frac{2}{5}$	$\frac{1}{3}+\frac{3}{5}$
d.	$\frac{1}{3}+\frac{3}{4}$	$\frac{1}{2}+\frac{3}{5}$	$\frac{2}{3}+\frac{3}{5}$

3. Subtract:

	A	*B*	*C*
a.	$\frac{1}{2}-\frac{1}{3}$	$\frac{1}{2}-\frac{1}{5}$	$\frac{2}{5}-\frac{1}{3}$
b.	$\frac{1}{3}-\frac{1}{4}$	$\frac{1}{3}-\frac{1}{5}$	$\frac{2}{3}-\frac{1}{5}$
c.	$\frac{2}{3}-\frac{1}{2}$	$\frac{1}{2}-\frac{2}{5}$	$\frac{3}{5}-\frac{1}{3}$

Addition of Fractions

Written Exercises

1. A boy divided a strip of copper into four pieces measuring, respectively, $\frac{2}{3}$ ft., $\frac{3}{4}$ ft., $\frac{5}{6}$ ft., and $\frac{7}{8}$ ft. What was the length of the strip?

PROCESS

Find the least common denominator of $\frac{5}{6}$ and $\frac{7}{8}$, rejecting the other denominators 3 and 4, each of which is a factor of 6 or of 8. Test successive multiples of 8, until one is found, 24, that is a multiple of 6; 24 is the required common denominator.

Change each fraction to 24ths, writing only the new numerators in a line under the common denominator. Write the sum of the numerators, 75, over the denominator, 24. Change $\frac{75}{24}$ to $3\frac{3}{24}$, and then to $3\frac{1}{8}$.

	24
$\frac{2}{3}$	16
$\frac{3}{4}$	18
$\frac{5}{6}$	20
$\frac{7}{8}$	21
Ans. $3\frac{1}{8}$	$\frac{75}{24} = 3\frac{3}{24} = 3\frac{1}{8}$

2. Add the following:

	A	*B*	*C*
a.	$\frac{1}{2}+\frac{1}{3}+\frac{1}{4}$	$\frac{1}{2}+\frac{2}{3}+\frac{5}{8}$	$\frac{1}{2}+\frac{2}{3}+\frac{2}{5}$
b.	$\frac{1}{3}+\frac{1}{4}+\frac{1}{6}$	$\frac{1}{2}+\frac{2}{3}+\frac{3}{8}$	$\frac{1}{2}+\frac{2}{3}+\frac{5}{9}$
c.	$\frac{1}{2}+\frac{1}{4}+\frac{1}{5}$	$\frac{1}{3}+\frac{5}{6}+\frac{4}{15}$	$\frac{1}{2}+\frac{5}{6}+\frac{1}{10}$
d.	$\frac{1}{2}+\frac{1}{3}+\frac{1}{8}$	$\frac{1}{6}+\frac{4}{9}+\frac{5}{12}$	$\frac{2}{3}+\frac{3}{5}+\frac{1}{6}$
e.	$\frac{1}{4}+\frac{1}{5}+\frac{1}{10}$	$\frac{1}{6}+\frac{1}{10}+\frac{1}{15}$	$\frac{1}{2}+\frac{3}{4}+\frac{7}{10}$
f.	$\frac{1}{2}+\frac{2}{3}+\frac{3}{4}$	$\frac{1}{5}+\frac{3}{8}+\frac{7}{10}$	$\frac{1}{2}+\frac{5}{12}+\frac{1}{8}$
g.	$\frac{1}{3}+\frac{3}{4}+\frac{5}{6}$	$\frac{2}{3}+\frac{3}{4}+\frac{4}{9}$	$\frac{5}{6}+\frac{7}{8}+\frac{3}{4}$
h.	$\frac{1}{2}+\frac{3}{4}+\frac{2}{5}$	$\frac{1}{2}+\frac{5}{6}+\frac{7}{15}$	$\frac{2}{3}+\frac{5}{8}+\frac{1}{12}$

Addition of Mixed Numbers

1. A boy divided a rope into four pieces measuring $17\frac{1}{2}$ yd., $8\frac{2}{3}$ yd., $\frac{5}{9}$ yd., $20\frac{3}{4}$ yd., and $9\frac{5}{12}$ yd., respectively. What was the length of the rope?

PROCESS

Reject the denominators 2, 3, and 4, each of which is a factor of 9 or of 12. Test successive multiples of 12, until one is found, 36, that is a multiple of 9; write 36 as the common denominator.

		36
	$17\frac{1}{2}$	18
	$8\frac{2}{3}$	24
	$\frac{5}{9}$	20
	$20\frac{3}{4}$	27
	$9\frac{5}{12}$	15
Ans.	$56\frac{8}{9}$	$\frac{104}{36} = 2\frac{32}{36} = 2\frac{8}{9}$

Change the fractions to 36ths, find their sum, and reduce the result to $2\frac{8}{9}$. Write $\frac{8}{9}$ under the original fractions and carry 2 to the ones' column of the whole numbers.

2. Add the following:

	A	*B*	*C*	*D*	*E*
a.	$6\frac{1}{2}$	$10\frac{2}{3}$	$33\frac{1}{4}$	53	$17\frac{4}{5}$
	$20\frac{1}{3}$	$5\frac{3}{4}$	16	$20\frac{5}{8}$	$12\frac{1}{6}$
	15	$27\frac{1}{8}$	$2\frac{2}{5}$	$7\frac{1}{6}$	13
	$3\frac{1}{15}$	19	$1\frac{3}{8}$	$9\frac{5}{12}$	$11\frac{3}{10}$
b.	$24\frac{1}{6}$	$30\frac{3}{4}$	27	$3\frac{3}{4}$	$16\frac{5}{9}$
	$7\frac{3}{10}$	36	$18\frac{5}{6}$	$17\frac{1}{5}$	$27\frac{3}{4}$
	$16\frac{11}{15}$	$7\frac{1}{5}$	$12\frac{5}{9}$	28	$8\frac{2}{3}$
	20	$8\frac{3}{8}$	$7\frac{5}{12}$	$9\frac{9}{10}$	42

Subtraction of Mixed Numbers

Preparatory Exercises

1. What fraction added to $\frac{7}{8}$ gives 1 as the sum?

2. What fraction added to $\frac{7}{8}$ gives a sum $\frac{1}{8}$ greater than 1?

$$\tfrac{7}{8} + ? = 1\tfrac{1}{8}.$$

3. What fraction added to $\frac{7}{8}$ gives $1\frac{1}{4}$ as the sum?

$$\tfrac{7}{8} + ? = 1\tfrac{1}{4}$$

Sight Exercises

Subtract:

	A	*B*	*C*	*D*	*E*	*F*
a.	$1 - \frac{7}{8}$	$1\frac{1}{8} - \frac{7}{8}$	$1\frac{1}{4} - \frac{7}{8}$	$1\frac{3}{8} - \frac{7}{8}$	$1\frac{1}{2} - \frac{7}{8}$	$1\frac{5}{8} - \frac{7}{8}$
b.	$1 - \frac{5}{6}$	$1\frac{1}{6} - \frac{5}{6}$	$1\frac{1}{3} - \frac{5}{6}$	$1\frac{1}{2} - \frac{5}{6}$	$1\frac{2}{3} - \frac{5}{6}$	$1\frac{3}{4} - \frac{7}{8}$
c.	$1\frac{1}{5} - \frac{2}{5}$	$1\frac{1}{5} - \frac{3}{5}$	$1\frac{1}{5} - \frac{4}{5}$	$1\frac{2}{5} - \frac{3}{5}$	$1\frac{2}{5} - \frac{4}{5}$	$1\frac{3}{5} - \frac{4}{5}$
d.	$1\frac{1}{4} - \frac{1}{2}$	$1\frac{1}{3} - \frac{2}{3}$	$1\frac{1}{6} - \frac{1}{3}$	$1\frac{1}{4} - \frac{1}{3}$	$1\frac{1}{3} - \frac{3}{4}$	$1\frac{1}{2} - \frac{3}{4}$
e.	$1\frac{1}{8} - \frac{1}{4}$	$1\frac{1}{8} - \frac{1}{2}$	$1\frac{1}{8} - \frac{3}{4}$	$1\frac{3}{8} - \frac{1}{2}$	$1\frac{3}{8} - \frac{3}{4}$	$1\frac{1}{2} - \frac{5}{8}$
f.	$2\frac{1}{8} - \frac{1}{4}$	$3\frac{1}{8} - \frac{1}{2}$	$4\frac{1}{8} - \frac{3}{4}$	$5\frac{3}{8} - \frac{1}{2}$	$6\frac{3}{8} - \frac{3}{4}$	$7\frac{1}{8} - \frac{5}{8}$
g.	$4\frac{1}{6} - 3\frac{1}{3}$	$5\frac{1}{6} - 4\frac{1}{2}$	$6\frac{1}{3} - 5\frac{1}{2}$	$7\frac{1}{6} - 6\frac{2}{3}$	$8\frac{3}{8} - 7\frac{1}{2}$	$9\frac{1}{4} - 8\frac{1}{3}$

1. From $60\frac{17}{36}$ yards of iron cable a man cut $32\frac{8}{9}$ yards. How many yards were left?

PROCESS

Since 36 is a multiple of 9, 36 is the least common denominator. Write 36, and underneath it the numerator 17, and the new numerator 32. Since $\frac{32}{36}$ is greater than $\frac{17}{36}$, increase the latter by 1, making it $1\frac{17}{36}$, and change it to the improper fraction $\frac{53}{36}$, writing the numerator of the latter alongside for convenience in performing the subtraction. Take 32 from 53, writing the difference, 21, over the common denominator. Reduce $\frac{21}{36}$ to $\frac{7}{12}$. Write $\frac{7}{12}$ under the original fractions and carry 1 to the ones' figure of the subtrahend. Say 3 and 7 (writing 7) are 10; carrying 1 to 3, say 4 and 2 (writing 2) are 6.

Test by adding the remainder and the subtrahend.

		36	
	$60\frac{17}{36}$	17	53
	$-32\frac{8}{9}$	32	
Ans.	$27\frac{7}{12}$	$\frac{21}{36}=\frac{7}{12}$	

2. Subtract. Test:

	A	*B*	*C*
a.	$51\frac{1}{3}-27\frac{5}{9}$	$48\frac{1}{2}-27\frac{5}{6}$	$86\frac{1}{8}-37\frac{3}{4}$
b.	$80\frac{2}{3}-16\frac{7}{8}$	$35\frac{3}{4}-12\frac{8}{9}$	$63\frac{2}{3}-36\frac{2}{3}$
c.	$93\frac{1}{6}-18\frac{3}{4}$	$80\frac{2}{9}-27\frac{5}{12}$	$53\frac{1}{2}-36\frac{7}{9}$
d.	$75\frac{2}{3}-55\frac{3}{4}$	$67\frac{1}{2}-49\frac{11}{15}$	$42\frac{3}{4}-36\frac{4}{5}$
e.	$30\frac{1}{2}-15\frac{7}{10}$	$40\frac{2}{3}-14\frac{7}{10}$	$50\frac{1}{3}-20\frac{3}{4}$
f.	$60\frac{1}{4}-20\frac{3}{10}$	$70\frac{3}{4}-23\frac{9}{10}$	$80\frac{5}{6}-70\frac{7}{8}$
g.	$90\frac{1}{3}-75\frac{4}{10}$	$80\frac{1}{6}-46\frac{3}{10}$	$70\frac{2}{9}-40\frac{3}{7}$
h.	$62\frac{1}{2}-27\frac{7}{10}$	$28\frac{2}{3}-19\frac{8}{9}$	$30\frac{1}{3}-15\frac{7}{12}$

Oral Problems

1. From a tub containing $50\frac{1}{2}$ pounds of butter there were sold $20\frac{3}{4}$ pounds. How many pounds remain?

2. What is the cost of 8 yards of muslin at $10\frac{3}{4}$ cents a yard?

3. How much is received for $10\frac{1}{2}$ yards of velvet sold at \$ 4 per yard?

4. A coat takes $3\frac{1}{2}$ yards of cloth and a vest $\frac{7}{8}$ yard. How many yards are required for both?

5. After walking $2\frac{7}{8}$ miles, how far must a girl still walk to complete $4\frac{1}{2}$ miles?

6. If the distance around a running track is a quarter of a mile, how many times around it must a boy run to go $2\frac{1}{2}$ miles?

7. At $40\frac{1}{2}$ miles per hour, how far will a train go in 10 hours?

8. If it requires 3 bushels of seed wheat for 2 acres, how many acres can be sown with 30 bushels?

9. (*a*) At \$ $\frac{1}{4}$ each, how many books can be bought for \$ $8\frac{1}{4}$? (*b*) How many books at \$ $\frac{3}{4}$ each can be bought for \$ $8\frac{1}{4}$?

10. At $1\frac{3}{4}$ bushels to the acre, how many bushels of oats will be required to sow 40 acres?

11. At the rate of $31\frac{1}{2}$ gallons to a barrel, how many gallons are there in a hogshead of 2 barrels?

12. Take three times $1\frac{1}{2}$ from 100.

Written Problems

1. From a tub containing $52\frac{1}{4}$ pounds of butter $27\frac{1}{2}$ pounds have been sold. How many pounds are left?

2. Find the cost of 8 yards of dress goods at $56\frac{3}{4}$ cents per yard.

3. A man buys $23\frac{1}{2}$ yards of velvet at \$ 3.60 per yard. How much does he pay for it?

4. How much cloth is required to make a suit if the coat takes $3\frac{1}{2}$ yards, the vest $\frac{7}{8}$ yard, and the trousers $1\frac{3}{4}$ yards?

5. After riding $12\frac{3}{5}$ miles, how many miles remain of a journey of $20\frac{3}{10}$ miles?

6. If the distance around a track is an eighth of a mile, how many laps must a bicycle rider make to complete $13\frac{3}{4}$ miles?

7. At $37\frac{3}{8}$ miles per hour, how far will a train go in 10 hours?

8. If it requires 3 bushels of seed wheat to sow 2 acres, how many acres can be sown with 72 bushels?

9. (*a*) At \$ $\frac{1}{4}$ each, how many books can be bought for \$ $18\frac{3}{4}$? (*b*) If the books are 3 quarter dollars each, how many can be bought for \$ $18\frac{3}{4}$?

10. At $1\frac{3}{4}$ bushels to the acre, how many bushels of seed will be required for 56 acres?

11. There are $5\frac{1}{2}$ yards in a rod. How many inches are there in a rod?

Product of a Mixed Number and a Whole Number

Preparatory Exercises

1. Add $\frac{1}{2}$ and $\frac{1}{2}$. Add $12\frac{1}{2}$ and $12\frac{1}{2}$. Multiply $12\frac{1}{2}$ by 2.

2. How many quarters are 8 times 1 quarter? How many ones are 8 times $\frac{1}{4}$? Multiply $\$\frac{1}{4}$ by 8. Multiply $\$1\frac{1}{4}$ by 4.

3. What will 8 baseballs cost at $\$1\frac{1}{4}$ each?

4. How many fourths are 8 times 3 fourths? How many ones are 24 fourths? $\frac{3}{4}$ of 8 = ? 8 times $\frac{3}{4}$ = ?

5. Multiply $7\frac{2}{3}$ by 12.

PROCESS

$7\frac{2}{3} \times 12 = 92$ *Ans.*

Think 12 times 2 thirds are 24 thirds, or 8. Carry 8 to 12 times 7 (84), making 92. Write 92.

Test by dividing 92 by 12.

Sight Exercises

Give products:

	A	*B*	*C*	*D*	*E*	*F*
a.	$6\frac{1}{2}$	$4\frac{1}{4}$	$4\frac{1}{4}$	$3\frac{1}{2}$	$2\frac{1}{4}$	$1\frac{3}{4}$
	$\times 2$	$\times 4$	$\times 6$	$\times 8$	$\times 8$	$\times 4$
b.	$3\frac{1}{3}$	$4\frac{1}{3}$	$5\frac{2}{3}$	$6\frac{1}{3}$	$7\frac{2}{3}$	$8\frac{2}{3}$
	$\times 3$	$\times 6$	$\times 3$	$\times 9$	$\times 6$	$\times 9$
c.	$9\frac{1}{5}$	$8\frac{2}{5}$	$7\frac{3}{5}$	$6\frac{4}{5}$	$5\frac{1}{6}$	$4\frac{5}{6}$
	$\times 5$	$\times 5$	$\times 5$	$\times 5$	$\times 6$	$\times 6$

Written Exercises

1. A barrel of potatoes weighed $246\frac{3}{4}$ lbs. What would be the probable weight of 12 barrels?

PROCESS

Think 12 times $\frac{3}{4}$ are $\frac{36}{4}$, or 9. Carry 9 to 12 times 6 (72), making 81, etc. Test by dividing 2961 by 12.

$246\frac{3}{4}$ lb.
12
Ans. 2961 lb.

2. Find products:

	A	*B*	*C*
a.	$25\frac{1}{2} \times 8$	$17\frac{1}{4} \times 8$	$33\frac{1}{3} \times 6$
b.	$46\frac{3}{4} \times 4$	$28\frac{3}{5} \times 5$	$66\frac{2}{3} \times 9$
c.	$75\frac{3}{8} \times 8$	$87\frac{2}{3} \times 6$	$93\frac{3}{4} \times 8$
d.	$18\frac{3}{4} \times 12$	$26\frac{4}{5} \times 10$	$42\frac{2}{3} \times 12$

3. Multiply $437\frac{1}{4}$ by 126.

PROCESS

Reduce $\frac{126}{4}$, the product of $\frac{1}{4}$ by 126, to $31\frac{1}{2}$ by dividing 126 by 4 (without rewriting these numbers), and change $\frac{2}{4}$ to $\frac{1}{2}$. Write $31\frac{1}{2}$.

Multiply 437 by 6, placing the right-hand figure of the product in the ones' column. Place the right-hand figure of the product by 2 tens and by 1 hundred in the tens' and hundreds' columns, respectively. Combine the partial products.

$437\frac{1}{4}$
126
$31\frac{1}{2}$
2622
874
437
$55093\frac{1}{2}$ *Ans.*

4. Find products:

	A	*B*	*C*
a.	$36\frac{1}{3} \times 25$	$29\frac{1}{4} \times 17$	$63\frac{1}{6} \times 15$
b.	$42\frac{1}{8} \times 18$	$54\frac{1}{2} \times 31$	$70\frac{1}{8} \times 27$
c.	$91\frac{1}{9} \times 19$	$83\frac{1}{10} \times 16$	$65\frac{1}{12} \times 26$
d.	$72\frac{1}{7} \times 23$	$52\frac{1}{11} \times 24$	$44\frac{1}{3} \times 22$

5. Multiply $275\frac{5}{6}$ by 16.

PROCESS

Find the product of $\frac{5}{6}$ by 16 by multiplying 16 by 5, and dividing the result by 6, reducing the fraction $\frac{4}{6}$ to $\frac{2}{3}$. Under this write the product of 6 times 275, etc.

$$
\begin{array}{r}
275\frac{5}{6} \\
16 \\
\hline
6)80 \\
13(\frac{2}{6})\frac{1}{3} \\
1650 \\
275 \\
\hline
4413\frac{1}{3} \quad \textit{Ans.}
\end{array}
$$

	A	*B*	*C*
a.	$48\frac{2}{3} \times 25$	$37\frac{3}{4} \times 17$	$64\frac{5}{6} \times 15$
b.	$73\frac{4}{5} \times 16$	$82\frac{3}{8} \times 14$	$90\frac{2}{9} \times 24$
c.	$56\frac{3}{10} \times 13$	$62\frac{5}{12} \times 18$	$86\frac{7}{8} \times 21$
d.	$70\frac{5}{9} \times 19$	$58\frac{2}{5} \times 23$	$49\frac{7}{12} \times 22$
e.	$22\frac{5}{6} \times 16$	$41\frac{2}{3} \times 22$	$75\frac{3}{5} \times 31$
f.	$31\frac{5}{8} \times 22$	$32\frac{3}{4} \times 31$	$54\frac{5}{8} \times 33$
g.	$63\frac{2}{5} \times 31$	$23\frac{4}{5} \times 18$	$43\frac{7}{9} \times 21$
h.	$45\frac{2}{9} \times 15$	$55\frac{3}{8} \times 17$	$32\frac{2}{3} \times 22$
i.	$54\frac{2}{3} \times 20$	$34\frac{4}{9} \times 13$	$21\frac{7}{8} \times 14$

6. Multiply 285 by $16\frac{1}{6}$.

PROCESS

Find the product of 285 by $\frac{1}{6}$ by dividing 285 by 6. Find the other two partial products and combine the three.

285
$16\frac{1}{6}$
$47(\frac{3}{6})\frac{1}{2}$
1710
285
$4607\frac{1}{2}$ *Ans.*

	A	*B*	*C*
a.	$25 \times 13\frac{1}{2}$	$37 \times 14\frac{1}{3}$	$49 \times 15\frac{1}{4}$
b.	$52 \times 16\frac{1}{5}$	$63 \times 17\frac{1}{6}$	$74 \times 18\frac{1}{7}$
c.	$82 \times 19\frac{1}{8}$	$98 \times 21\frac{1}{9}$	$87 \times 45\frac{1}{10}$

7. Multiply 285 by $23\frac{5}{6}$.

PROCESS

Find the product of 285 by $\frac{5}{6}$ by multiplying 285 by 5 and dividing the result by 6, reducing the fraction.

285
$23\frac{5}{6}$
6)1425
$237(\frac{3}{6})\frac{1}{2}$
855
570
$6792\frac{1}{2}$ *Ans.*

	A	*B*	*C*
a.	$98 \times 23\frac{3}{4}$	$98 \times 24\frac{2}{3}$	$78 \times 25\frac{3}{6}$
b.	$67 \times 26\frac{5}{6}$	$58 \times 27\frac{3}{7}$	$49 \times 32\frac{5}{8}$
c.	$39 \times 33\frac{3}{10}$	$27 \times 34\frac{5}{12}$	$36 \times 41\frac{4}{5}$
d.	$47 \times 42\frac{3}{8}$	$54 \times 43\frac{2}{7}$	$63 \times 44\frac{7}{12}$
e.	$72 \times 51\frac{2}{6}$	$66 \times 62\frac{7}{8}$	$55 \times 73\frac{9}{10}$

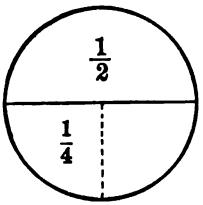
Multiplication of Fractions

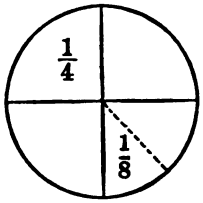
Preliminary Exercises

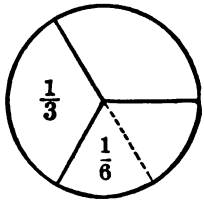
1. A boy earned $\$\frac{1}{2}$. He gave $\frac{1}{2}$ of it to his sister. What part of a dollar did he give her?

2. Draw 3 circles. Divide one of them into 2 halves, one into 4 fourths, and one into 3 thirds.

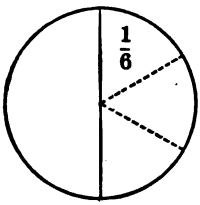
3. What is (*a*) $\frac{1}{2}$ of $\frac{1}{2}$? (*b*) $\frac{1}{2}$ of $\frac{1}{4}$? (*c*) $\frac{1}{2}$ of $\frac{1}{3}$?

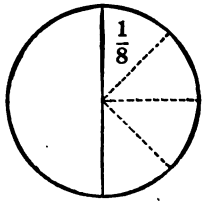






4. Draw two circles. Divide each into halves.





5. What is (*a*) $\frac{1}{3}$ of $\frac{1}{2}$? (*b*) $\frac{1}{4}$ of $\frac{1}{2}$? (*c*) $\frac{1}{5}$ of $\frac{1}{2}$? (*d*) $\frac{1}{6}$ of $\frac{1}{2}$? (*e*) $\frac{1}{3}$ of $\frac{1}{4}$? (*f*) $\frac{1}{4}$ of $\frac{1}{3}$?

6. What is (*a*) $\frac{1}{2}$ of 2 thirds? (*b*) $\frac{1}{3}$ of 3 fourths? (*c*) $\frac{1}{2}$ of 4 fifths? (*d*) $\frac{1}{4}$ of 4 fifths?

7. At $\$\frac{1}{2}$ per yard, find the cost of (*a*) 4 yards; (*b*) 3 yards; (*c*) 2 yards; (*d*) $\frac{1}{2}$ yard; (*e*) $1\frac{1}{2}$ yards.

8. (*a*) 4 times $\$\frac{1}{2}=?$ (*b*) $3\times\$\frac{1}{2}=?$ (*c*) $2\times\$\frac{1}{2}=?$ (*d*) $\frac{1}{2}\times\$\frac{1}{2}=?$ (*e*) $1\frac{1}{2}\times\$\frac{1}{2}=?$

Written Exercises

1. Multiply $7\frac{1}{2}$ by (*a*) $\frac{1}{2}$; (*b*) $\frac{1}{3}$; (*c*) $1\frac{1}{2}$; (*d*) $1\frac{1}{3}$; (*e*) $2\frac{1}{4}$.

PROCESS

(*a*) $7\frac{1}{2} \times \frac{1}{2} = \frac{15}{2} \times \frac{1}{2} = \frac{15}{4} = 3\frac{3}{4}$ *Ans.*

Change $7\frac{1}{2}$ to an improper fraction and rewrite the fractions. Place 15, the product of the numerators, over 4, the product of the denominators, making $\frac{15}{4}$. Reduce this to a mixed number.

(*b*) $7\frac{1}{2} \times \frac{1}{3} = \frac{\overset{5}{\cancel{15}}}{2} \times \frac{1}{\cancel{3}} = \frac{5}{2} = 2\frac{1}{2}$ *Ans.*

Cancel 3 in a denominator and 15 in a numerator. Place the product of the numerators, as changed, over that of the denominators, etc.

(*c*) $7\frac{1}{2} \times 1\frac{1}{2} = \frac{15}{2} \times \frac{3}{2} = \frac{45}{4} = 11\frac{1}{4}$ *Ans.*

Change both mixed numbers to improper fractions, etc.

(*d*) $7\frac{1}{2} \times 1\frac{1}{3} = \frac{\overset{5}{\cancel{15}}}{\cancel{2}} \times \frac{\overset{2}{\cancel{4}}}{\cancel{3}} = 10$ *Ans.*

Cancel 3 and 15 by 3, 2 and 4 by 2. Omit 1, the product of the changed denominators, and write only 10, the product of the changed numerators.

(*e*) $7\frac{1}{2} \times 2\frac{1}{4} = \frac{15}{2} \times \frac{9}{4} = \frac{135}{8} = 16\frac{7}{8}$ *Ans.*

2. Multiply:

	A	*B*	*C*
a.	$16\frac{2}{3} \times 2\frac{1}{2}$	$12\frac{3}{4} \times 3\frac{1}{3}$	$18\frac{4}{5} \times 4\frac{1}{4}$
b.	$20\frac{1}{2} \times 3\frac{1}{2}$	$18\frac{1}{2} \times 4\frac{1}{3}$	$15\frac{1}{2} \times 5\frac{1}{4}$

Division of Fractions

Preliminary Exercises

1. A man divided $\$\frac{1}{2}$ equally between his 2 children. What part of $\$1$ did each receive?

2. If I have $\$6$, how many times can I spend (*a*) $\$\frac{1}{2}$? (*b*) $\$\frac{1}{4}$?

3. If I have $\$6$ in quarters, how many times can I spend 3 quarters?

4. To save $\$6$, how many times must I save (*a*) $\$\frac{1}{2}$? (*b*) $\$\frac{1}{4}$? (*c*) $\$\frac{3}{4}$?

5. (*a*) $6 \div \frac{1}{2} = ?$ (*b*) $6 \div \frac{1}{4} = ?$ (*c*) $6 \div \frac{3}{4} = ?$

6. Give quotients:

(*a*) $2\overline{)12}$ (*b*) $\frac{1}{2}\overline{)12}$ (*c*) $\frac{1}{4}\overline{)12}$ (*d*) $\frac{3}{4}\overline{)12}$

7. Give dividends:

(*a*) $2\overline{)\,?\,}$ 12 (*b*) $\frac{1}{2}\overline{)\,?\,}$ 12 (*c*) $\frac{1}{4}\overline{)\,?\,}$ 12 (*d*) $\frac{3}{4}\overline{)\,?\,}$ 12

8. Give divisors:

(*a*) $?\overline{)48}$ 24 (*b*) $?\overline{)18}$ 24 (*c*) $?\overline{)24}$ 48 (*d*) $?\overline{)10}$ 40

9. (*a*) $6 \div \frac{1}{2} = 6 \times ?$ (*b*) $6 \div \frac{1}{4} = 6 \times ?$ (*c*) $6 \div \frac{3}{4} = 6 \times ?$ (*d*) $6 \div \frac{2}{3} = 6 \times ?$ (*e*) $6 \div \frac{2}{3} = 6 \times ?$

10. Give quotients:

(*a*) $\frac{3}{2}\overline{)12}$ (*b*) $\frac{4}{3}\overline{)12}$ (*c*) $\frac{5}{4}\overline{)10}$ (*d*) $\frac{6}{5}\overline{)12}$

(*e*) $12 \div 1\frac{1}{2}$ (*f*) $12 \div 1\frac{1}{3}$ (*g*) $10 \div 1\frac{1}{4}$ (*h*) $12 \div 1\frac{1}{5}$

Written Exercises

1. At $\$ 1\frac{1}{2}$ per yard, how many yards of cloth can be bought for $\$ 9\frac{3}{4}$?

PROCESS

The number of yards is the quotient of $9\frac{3}{4}$ by $1\frac{1}{2}$.

$$\begin{array}{ccccc} (a) & & (b) & & (c) \\ 9\frac{3}{4} \div 1\frac{1}{2} = \frac{39}{4} \div \frac{3}{2} = \frac{\overset{13}{\cancel{39}}}{\underset{2}{\cancel{4}}} \times \frac{\cancel{2}}{\cancel{3}} = \frac{13}{2} = 6\frac{1}{2} \text{ (yd.)} \end{array}$$

In (a) indicate the division of the mixed numbers. In (b) rewrite the mixed numbers as improper fractions. In (c) indicate the multiplication of the dividend by the divisor inverted. Perform the indicated multiplication.

TEST

Multiply the quotient $6\frac{1}{2}$ by the divisor $1\frac{1}{2}$.

$$6\frac{1}{2} \times 1\frac{1}{2} = \frac{13}{2} \times \frac{3}{2} = \frac{39}{4} = 9\frac{3}{4}.$$

2. Find quotients:

	A	*B*	*C*
a.	$9\frac{3}{4} \div 6\frac{1}{2}$	$19\frac{1}{2} \div 29\frac{1}{4}$	$83\frac{1}{3} \div 12\frac{1}{2}$
b.	$83\frac{1}{3} \div 6\frac{2}{3}$	$12\frac{1}{2} \div 83\frac{1}{3}$	$71\frac{3}{4} \div 10\frac{1}{4}$
c.	$71\frac{3}{4} \div 3\frac{1}{2}$	$10\frac{1}{4} \div 71\frac{3}{4}$	$87\frac{1}{2} \div 100$
d.	$87\frac{1}{2} \div 6\frac{1}{4}$	$12\frac{1}{2} \div 87\frac{1}{2}$	$87\frac{1}{2} \div 16\frac{2}{3}$
e.	$37\frac{1}{2} \div 3\frac{1}{8}$	$12\frac{1}{2} \div 33\frac{1}{3}$	$81\frac{1}{4} \div 33\frac{1}{3}$

Fractional Relations

1. The operation

a. Of finding 2 times 8 is indicated thus: 2×8.

b. Of finding $2\frac{1}{2}$ times 8: $2\frac{1}{2} \times 8$.

c. Of finding $2\frac{3}{4}$ times 8: $2\frac{3}{4} \times 8$.

d. Of finding $\frac{1}{2}$ times 8: $\frac{1}{2} \times 8$.

e. Of finding $\frac{3}{4}$ times 8: $\frac{3}{4} \times 8$.

f. Of finding $\frac{3}{4}$ of 8: $\frac{3}{4} \times 8$.

2. Each of the foregoing is a *multiplication* example, even if one-half of 8 is obtained by dividing the latter by 2.

3. The operation of finding the number

a. That produces 16 when multiplied by 2 is indicated thus: $16 \div 2$.

b. That produces 20 when multiplied by $2\frac{1}{2}$: $20 \div 2\frac{1}{2}$.

c. That produces 22 when multiplied by $2\frac{3}{4}$: $22 \div 2\frac{3}{4}$.

d. That produces 4 when multiplied by $\frac{1}{2}$: $4 \div \frac{1}{2}$.

e. That produces 6 when multiplied by $\frac{3}{4}$: $6 \div \frac{3}{4}$.

f. The operation of finding the number of which 4 is $\frac{1}{2}$ is indicated thus: $4 \div \frac{1}{2}$.

g. Of which 6 is $\frac{3}{4}$: $6 \div \frac{3}{4}$.

4. Each of the foregoing is a *division* example, even if $8 \div \frac{1}{2}$ is obtained by multiplying the former by 2.

Oral Problems — One Operation

State the operation required to solve each of the following examples when the given numbers are employed.

1. When dress goods are 48 cents a yard, what is the cost of $\frac{3}{4}$ yard?

2. When $\frac{3}{4}$ pound of coffee costs 18 cents, what is the price of a pound?

3. When tea is 60 cents a pound, how much can be bought for 90 cents?

4. What part of a book of 60 pages have I read when I have completed 40 pages?

5. What is $\frac{7}{12}$ of 84?

6. What fraction of 84 is 49?

7. 40 is $\frac{2}{3}$ of what number?

8. 24 is what fraction of 32?

9. 55 contains 15 how many times and what fraction of a time?

10. 10 is what fraction of 15?

11. How many quarter pints of ice cream are there in 3 pints? If a boy eats $\frac{3}{4}$ pint, how many boys will eat 3 pints?

12. How many times can I take a quarter out of a box containing 6 dollars in quarters? How many times can I take 3 quarters out of the same box? How many times can I take out 2 quarters?

Written Problems

NOTE. First indicate the solution by placing the proper sign between the given numbers.

1. When cloth is 96 cents a yard, what is the cost of $\frac{3}{4}$ yard?

2. When $\frac{3}{4}$ pound of tea costs 45 cents, what is the price of a pound?

3. When dress goods are 64 cents a yard how many yards can be bought for 88 cents?

4. What part of a book of 64 pages have I read when I have finished 24 pages?

5. (*a*) What is $\frac{11}{16}$ of 96? (*b*) $\frac{23}{24}$ of 144?

6. What fraction of 96 is (*a*) 44? (*b*) 72? (*c*) 36?

7. 72 is (*a*) $\frac{18}{25}$ of what number? (*b*) $\frac{9}{17}$ of what?

8. 64 is what fraction (*a*) of 96? (*b*) Of 144?

9. How many times and what fraction of a time does 448 contain 160?

10. (*a*) 128 is what fraction of 160? (*b*) 156 is what fraction of 160? (*c*) 20 is what fraction of 64?

11. (*a*) How many quarter pints are there in 27 pints of ice cream? (*b*) Among how many boys can 27 pints be divided if each receives 3 quarter pints?

12. How many $\frac{3}{4}$ inches are there (*a*) in 12 inches? How many are there (*b*) in 18 inches? (*c*) In 1 yard?

Decimals

Preparatory Exercises

1. In writing \$ 83.17, how many dollars does the 8 represent? The 3? What part of a dollar is represented by the 1? By the 7?

2. What part of a dollar is 17 cents? How many cents are there in $\frac{83}{100}$ of a dollar?

3. Express as dollars and cents:

\$ $3\frac{37}{100}$. \$ $15\frac{75}{100}$. \$ $32\frac{5}{100}$. \$ $74\frac{1}{100}$.

4. Express as dimes and cents:

\$ 0.77. \$ 0.49. \$ 0.82. \$ 0.03.

5. Express as *tenths* of a dollar. As *hundredths* of a dollar:

\$ 0.40. \$ 0.10. \$ 0.30. \$ 0.50.

6. What part of a dollar is 30 cents, 70 cents, 10 cents, 90 cents?

7. Express as *hundredths* of a dollar:

\$ 0.37. \$ 0.13. \$ 0.75. \$ 0.84.

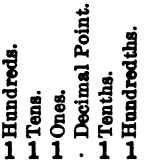
8. In the expression \$ 333.33, how many dollars are represented by the left-hand 3? By the next 3? By the next 3? What part of a dollar is represented by the next 3? By the right-hand 3?

9. Read \$ 333.33 as dollars and the fraction of a dollar. Read \$ 33.30 as dollars and the fraction of a dollar, expressing the fraction in lowest terms.

Notation and Numeration

Fractions such as $\frac{1}{2}$, $\frac{3}{4}$, $\frac{5}{12}$, etc., are called *common fractions;* fractions whose denominators are 10, 100, 1,000, and the like, are sometimes called *decimal fractions*, such as $\frac{3}{10}$, $\frac{17}{100}$, $\frac{9}{100}$, etc.

These fractions are called *decimals* when they are written without denominators, the prefixed *decimal point* showing that they are fractions.



The number 111.11 is read one hundred eleven, *and* eleven hundredths, the word "and" being used between the whole number and the decimal.

The number 23.4 is read twenty-three, and four tenths.

The number 256.03 is read two hundred fifty-six, and three hundredths.

The number .7 is read seven tenths; the number .56 is read fifty-six hundredths; the number .09 is read nine hundredths.

In the expression \$123.45, how many times is the value expressed (*a*) by 5 contained in the value expressed by 4 ? (*b*) The value expressed by 4 in that expressed by 3 ?

Reading and Writing Decimals

1. Read the following:

a. 103.27	*f.* 983.41
b. .5	*g.* .22
c. 20.03	*h.* 6.15
d. .87	*i.* 32.08
e. 864.09	*j.* .7

2. Write as decimals or as whole numbers and decimals:

a. One hundred nine, and nine hundredths.
b. Twenty-seven, and seventy-three hundredths.
c. Five tenths.
d. Sixteen hundredths.
e. Eight hundred sixty-five, and seven tenths.

Reductions

Sight Exercises

Express the following decimals as common fractions in lowest terms:

	A	*B*	*C*	*D*
a.	.02	.25	.75	.22
b.	.5	.4	.04	.05
c.	.08	.84	.45	.38
d.	.95	.8	.12	.18
e.	.6	.85	.2	.06

Written Exercises

Write the following common fractions as decimals:

	A	*B*	*C*	*D*
a.	$\frac{1}{2}$	$\frac{1}{5}$	$\frac{9}{10}$	$\frac{12}{25}$
b.	$\frac{1}{10}$	$\frac{3}{10}$	$\frac{11}{25}$	$\frac{13}{20}$
c.	$\frac{1}{25}$	$\frac{3}{20}$	$\frac{4}{5}$	$\frac{13}{25}$
d.	$\frac{3}{4}$	$\frac{7}{25}$	$\frac{11}{20}$	$\frac{7}{10}$
e.	$\frac{1}{50}$	$\frac{1}{4}$	$\frac{3}{50}$	$\frac{13}{50}$

Sight Exercises

1. Give sums:

2.5	2.05	2.2
+3.5	+3.05	+3.25
6 *Ans.*	5.1 *Ans.*	5.45 *Ans.*

Omit a final decimal cipher in giving the answers.

A	*B*	*C*	*D*	*E*	*F*	*G*
1.5	1.25	2.5	3.	3.15	3.6	2.4
+1.5	+1.75	+1.25	+2.5	+3.4	+3.45	+2.7

2. Give remainders:

5.	3.5	4.75
−2.5	−1.5	−1.25
2.5 *Ans.*	2. *Ans.*	3.5 *Ans.*

Vacant decimal places in the subtrahend are considered to contain ciphers.

9.	8.5	7.35	6.5	5.55	4.7	3.
−4.5	−1.25	−4.25	−2.5	−3.5	−1.35	−1.8

Multiplying a Decimal by a Whole Number

3. Give products:

1.23	2.5	3.05	Place the decimal point in the product when it is reached in multiplying. Omit unnecessary ciphers.
×3	×4	×2	
3.69 *Ans.*	10. *Ans.*	6.1 *Ans.*	

2.5	2.03	3.5	4.05	4.05	4.5	.25
×3	×4	×2	×5	×4	×4	×8

Dividing a Decimal by a Whole Number

4. Give quotients:

4)9.	2)8.1	3).12	5)1.
2.25 *Ans.*	4.05 *Ans.*	.04 *Ans.*	.2 *Ans.*

Place the decimal point in the quotient when it is reached in dividing. Be careful not to omit a necessary cipher in the tenths' place of a quotient.

4)8.4	4)8.2	5)9.1	6)9	2)7.1	5)6.

Miscellaneous Exercises

5. Give answers:

	A	*B*	*C*
a.	2.6 + 3.4	1.25 + 1.5	2.05 + 1.7
b.	3.4 − 1.6	4.25 − 1.5	3.25 − 1.07
c.	3.4 × 5	1.02 × 5	1.24 × 3
d.	5.4 ÷ 5	1.05 ÷ 5	.1 ÷ 5

Written Exercises

Perform operations with decimals in the same way as operations with dollars and cents.

Addition and Subtraction of Decimals

> To add or to subtract decimals, write the decimal points in a vertical line, and the decimal point in the sum or the difference in this same line.

In writing results, reject unnecessary ciphers.
Thus, write 37 instead of 37.00, 28.5 instead of 28.50.

1. Find sums:

A	*B*	*C*	*D*	*E*
24.03	48.94	32.	16.66	37.7
5.6	.67	5.85	.49	25.08
18.	13.25	.4	.8	3.4
2.95	1.4	27.75	58.95	11.29

2. Find remainders:

a.	56.38	72.4	63.	86.42	90.
	−25.49	−5.96	−8.88	−19.72	−25.08
b.	45.32	50.2	14.06	21.3	37.24
	−22.66	−7.49	−.99	−1.85	−20.06
c.	95.	84.3	73.13	62.5	51.25
	−5.06	−2.42	−8.9	−56.03	−6.66

Multiplying a Decimal by a Whole Number

3. Find products:

> In multiplying or dividing a decimal by a whole number write the decimal point in the result when it is reached in performing the operations.

	A	*B*	*C*	*D*	*E*
a.	48.05	27.2	12.5	1.15	.24
	× 4	× 5	× 6	× 8	× 5
b.	37.09	56.4	23.5	3.25	.48
	× 7	× 2	× 4	× 8	× 5

Dividing a Decimal by a Whole Number

4. Find quotients:

	A	*B*	*C*	*D*	*E*
a.	4)90.	6)33.	4)11.	5)23.4	8)2.
b.	25)3.	48)60.	32)88.	64)3.2	64)16.
c.	4)4.2	6)5.7	8)10.	5)1.35	8)6.
d.	25)1.5	36)81.	16)12.	88)4.4	48)12.

Miscellaneous Written Examples

1. Find the sum of thirty-five and four hundredths, six and seven tenths, twenty-nine, three and ninety-six hundredths.

2. Find the difference between fifty-nine and eighty-three hundredths and seventeen and nine tenths.

3. Multiply by five the sum of six and ninety-four hundredths plus twelve and eighty-six hundredths.

4. Divide by forty-four the difference between eighty-four and ninety-five hundredths and eighty-seven and fifteen hundredths.

5. After walking 7.2 miles and riding 27.3 miles, how far has a man still to go to make a journey of 50 miles?

6. At 38.2 miles per hour, how far does a train go in 5 hours?

7. A French franc is equal to 19.3 cents. What is the value in our money of a 20-franc piece?

8. How many cents are equal to a German mark if 25 marks are worth $ 5.95?

9. If 100 pounds sterling are worth $ 486.65, what is the value of 500 pounds sterling?

10. A meter is 38.37 inches long. How many inches are there in 500 meters?

11. A man owns 100 acres. How many acres has he after he buys 24.2 acres and sells 48.45 acres?

Compound Numbers

Oral Exercises

1. How many hours in .25 day?

2. How many minutes in .2 hour?

3. How many hours in .3 day?

4. How many hours and minutes in .3 day?

5. What fraction of an hour is 12 minutes?

6. What decimal of an hour is 24 minutes?

7. Add 2 lb. 8 oz. and 2 lb. 8 oz.

8. From 3 lb. take 1 lb. 8 oz.

9. Multiply 4 lb. 8 oz. by 4.

10. Divide 4 lb. 8 oz. by 4.

11. One fourth of 5 lb. is how many pounds and ounces?

12. How many ounces are there in 4 lb. 8 oz?

13. Change .25 bushel (*a*) to pecks. (*b*) To quarts.

14. What fraction of a bushel is (*a*) 1 quart? (*b*) 2 quarts? (*c*) 3 quarts? (*d*) 4 quarts? (*e*) 6 quarts? (*f*) 8 quarts? (*g*) 12 quarts? (*h*) 16 quarts? (*i*) 18 quarts? (*j*) 24 quarts? (*k*) 28 quarts?

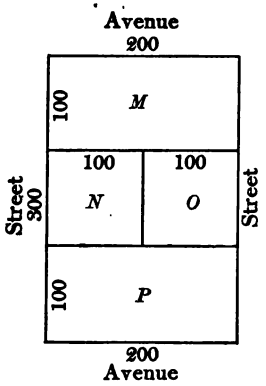
15. Change $\frac{3}{8}$ bushel to quarts.

16. How many half-pint glasses of lemonade are there (*a*) in a gallon? (*b*) In 10 gallons?

17. How many inches are there in 2 yards?

18. What fraction of a yard is 27 inches?

Measurements



1. The diagram represents a plot of ground 300 feet long, 200 feet wide. If the diagram is $1\frac{1}{2}$ inches by 1 inch, how many feet are represented by each inch of the diagram?

2. (*a*) How many square feet are there in the whole plot? How many square feet (*b*) in M? (*c*) In P? (*d*) In N? (*e*) In O?

3. (*a*) M represents what fraction of the whole? (*b*) What fraction does P represent? (*c*) N? (*d*) O?

4. (*a*) M is how many times N? (*b*) N is what part of M? (*c*) $\frac{1}{6}$ is what part of $\frac{1}{3}$? (*d*) $\frac{1}{3}$ is how many times $\frac{1}{6}$?

5. (*a*) Into how many building lots 25 feet front, 100 feet deep, facing the avenue, can M be divided? (*b*) Into how many can P be divided? (*c*) Into how many lots facing the street can N be divided? (*d*) O?

6. (*a*) M and P together form what part of the whole plot? (*b*) N and P? (*c*) N and O?

7. Divide a rectangle 4 inches by 2 inches into 8 one-inch squares. (*a*) What part of the whole rectangle is each square? (*b*) How many square inches in one half of the rectangle? (*c*) In one fourth? (*d*) In one eighth? (*e*) How many times $\frac{1}{4}$ is $\frac{1}{2}$? (*f*) How many times $\frac{1}{8}$ is $\frac{1}{2}$?

Volumes

1. How many bricks are there in a pile 3 bricks long, 2 bricks wide, 2 bricks high?

2. How long is the pile if a brick is 8 inches long, 4 inches wide, and $2\frac{1}{2}$ inches high? How wide is the pile? How high?

3. How many cubic inches in a pile of bricks 2 feet long, 8 inches wide, 5 inches high?

4. How many cubic inches in a peck if there are 2150.4 cubic inches in a bushel? How many cubic inches in a quart?

5. How many cubic inches will a box contain if it measures on the inside 4.2 inches by 4 inches by 4 inches?

6. Find the contents of a box 4.48 inches by 5 inches by 3 inches.

7. (*a*) How many cubic inches are there in a block 12 inches long, 12 inches wide, 12 inches high? (*b*) How many cubic inches are there in a cubic foot?

8. (*a*) How many cubic inches are there in $1\frac{1}{4}$ cu. ft.? (*b*) How many more cubic inches are there in $1\frac{1}{4}$ cu. ft. than there are in a bushel?

9. A gallon contains 231 cubic inches. (*a*) How many cubic inches are there in 7.5 gallons? (*b*) How many more cubic inches are there in $7\frac{1}{2}$ gallons than there are in a cubic foot?

Business Forms

Bills for Goods bought at One Time

1. Copy the following bill, inserting the missing extensions and the footings:

LOGANSPORT, IND., *Dec. 20, 1914*

Mrs. Wm. Priedigkeit
Cypress Hills

Bought of WALLACE GODETT
Dealer in Toys

	4 Dolls	*$1.50*	*6*	—	
	6 pr. Dolls' Shoes	*.15*			
	2 sets Dishes	*1.05*			
	1 Doll Carriage		*1*	*50*	
	2 boxes Tools	*.85*			
	8 strings Beads	*.10*			
	Received payment				*$*
	Dec. 20, 1914				
	Wallace Godett				
	Per S. M. Y.				

2. Make out a bill for the following goods. Use your own name as the buyer, and the name of a local dealer as the seller. Receipt the bill, adding the initials of a classmate as clerk. Do not use @ in the bill.

3½ lb. Nuts	@ 20¢
1¾ gal. Ice Cream	@ 80¢
4½ doz. Lemons	@ 24¢
6 boxes Strawberries	@ 12½¢
1 Pineapple	@ 30¢
3 Watermelons	@ 25¢

Goods bought at Different Times

3. Copy the following bill, inserting omitted items:

NEW YORK, *April 1, 1914*

Mrs. L. C. Alphin
131 Livingston St.

Bought of F. LOESER & Co.
Dry Goods
Fulton and Bond Sts.

1914							
Mch.	*2*	*2 pr. Gloves*	*$1.15*	*2*	*30*		
		14 1/2 yd. Muslin	*.12*				
	7	*3 1/3 doz. Buttons*	*.15*				
	15	*4 Tablecloths*	*2.75*				
		8 pc. Trimming	*.37 1/2*				
		1 Hat		*8*	—		
	27	*1/2 doz. Handkerchiefs*	*2.50*				
		4 pr. Stockings	*.45*				
						$	
	31	*By Cash*				*10*	—
		Balance Due					

The payment of $10 on Mar. 31 is called a payment *on account*. The bill is *settled* by the payment of the balance due, and is then receipted.

4. Supply dates, names, etc., for the following:

½ doz. Collars	@	$ 1.50
3 pr. Cuffs	@	25 ¢
1 Hat	@	$ 2.75
2 Ties	@	37½ ¢
2 pr. Gloves	@	75 ¢

Bill for Labor and Materials

5. Copy the following bill. Insert missing extensions and the footing. Receipt it of the date Oct. 3.

CHAMPAIGN CO., ILL., *Sept. 30, 1914*

Mr. Daniel Carroll

TO FRED. CHAMBERS, DR.

Steam Threshing

Sept.	*16*	*To 800 bu. Oats*	*.02*	*16*	—	
		630 " Wheat	*.04*			
		¾ ton Coal	*6.—*			
		2 Teams	*3.—*			
		4 Men	*1.75*			
						$

The foregoing bill is *rendered* by Mr. Chambers, who threshes Mr. Carroll's grain. Besides the charge for the threshing, the bill includes the cost of the coal used in the engine and also the labor of extra teams and men supplied by Mr. Chambers.

The abbreviation *Dr.*, debtor, means that Mr. Carroll is indebted to Mr. Chambers for the items specified.

6. Make out a carpenter's bill for making repairs. Use the following items: 1 man, 6 days, at $3.75; 1 helper, 2 days, at $2; 1 bunch shingles, at $1.25; 2 M boards at $30.

7. Make out a bill for 6 rolls of wall paper at 20 cents per roll; 20 yards of border at 3 cents per yard; hanging the paper at 25 cents per roll and 3 cents per yard for the border; 4 gallons of paint, at $1.80 per gallon; 2 days for painter, at $3 per day.

Miscellaneous

8. Make out bills for goods purchased as follows:

Date each the first of the month succeeding the one in which the goods are bought. Use your own name as buyer, and the name of a local dealer or firm as seller. Receipt each bill, adding the initials of a classmate as clerk. Make all extensions without using another sheet. Abbreviate quantities, and omit such unnecessary words as "of," "at," etc.

a. Jan. 5, 1915, bought 20 pounds of sugar at $5\frac{1}{2}$ cents per pound; 3 quarts of milk at 8 cents per quart; Jan. 11, 4 bars of soap at 15 cents per bar, 1 barrel of flour for $5.60; Jan. 18, 5 pounds of butter at 32 cents per pound, 6 gallons of oil at $16\frac{1}{2}$ cents per gallon.

b. Nov. 2, 1915, bought 24 pounds of nails at 6 cents and 1 hatchet for 75 cents; Nov. 8, 3 pails at 75 cents each; Nov. 11, 9 dozen screws at 18 cents per dozen; Nov. 15, gave 4 dozen eggs at 45 cents a dozen in part payment.

9. Make out the bill of the owner of a dry-goods store for six items bought at one time. Give credit on the bill for butter and eggs supplied the same day by the purchaser of the dry goods. Find the balance which is paid in cash, and receipt the bill.

NOTE. A bill showing credits is somtimes called a *statement.*

10. Make out a farmer's statement of hay and oats supplied a storekeeper at different dates. Credit the latter with goods delivered to the former. Receipt the statement.

11. Copy the following letter:

MADISON, WIS., Mch. 17, 1914

Martin Haupt & Sons
138–156 La Salle St.
Chicago, Ill.

Gentlemen

Kindly ship me the following by fast freight:

3 bbl. Portland Cement
10 M Shingles, Cedar
14 bbl. Wire Nails, 10's

Your early attention to this order is respectfully requested.

Truly yours
COTTIER JONES
R.F.D. No. 4

12. Copy the following reply:

138–156 LA SALLE ST.
CHICAGO, ILL., Mch. 19, 1914

Cottier Jones, Esq.
R.F.D. No. 4
Madison, Wis.

Dear Sir

We have shipped to-day by fast freight the goods ordered in your favor of the 17th inst.

Inclosed please find bill.

Yours sincerely
MARTIN HAUPT & SONS

13. Draw on the back of the first letter a rectangle $6\frac{1}{2}$ inches by $3\frac{1}{2}$ inches to represent an envelope. Write on it the address given on the next page.

MARTIN HAUPT & SONS
138–156 LA SALLE ST.
CHICAGO
ILLINOIS

14. On the back of the second letter draw an envelope and write the proper address.

15. Frank O'Malley has money in the National City Bank of Omaha. He owes Smith, Brown, & Co., of St. Louis, $154.36 for goods purchased from them. He *draws* his check as follows:

A Bank Check

No. 354 *Omaha, Neb., April 2, 1915*

NATIONAL CITY BANK

Pay to the order of ..... *Smith, Brown, & Co.* .....
One Hundred Fifty-four $\frac{36}{100}$ *Dollars*

$154 $\frac{36}{100}$ *Frank O'Malley*

Copy the foregoing check.

16. If Mr. O'Malley wishes to defer payment for a time, he may make a promissory note, as follows:

A Promissory Note

Omaha, Neb., April 2, 1915

Thirty days after date, I promise to pay to the order of Smith, Brown, & Co., One Hundred Fifty-four $\frac{36}{100}$ Dollars, value received, at the National City Bank.

$154 $\frac{36}{100}$ *Frank O'Malley*

On May 2, Smith, Brown, & Co. will collect $154.36 from the National City Bank, which sum will be deducted from the money Mr. O'Malley has in the bank.

Copy the foregoing note.

17. Make out the bill of Martin Haupt & Sons for the articles ordered by Cottier Jones (p. 240), using the prevailing prices.

18. Write Mr. Jones's note for the amount of the bill, promising to pay the same in sixty days after date, at a Madison bank.

When Mr. O'Malley's check reaches Smith, Brown, & Co., they send the former the following

Receipt in Full

St. Louis, Mo., April 4, 1915

Received of ------- Frank O'Malley ------- check for ~~~~~~~~~ One Hundred Fifty-four ~~~~~~~~~ $\frac{36}{100}$ Dollars in full of account to date.

$154 $\frac{36}{100}$ *Smith, Brown, & Co.*

If Mr. O'Malley should send a check for only $ 100, Smith, Brown, & Co. send him the following

Receipt on Account

St. Louis, Mo., April 4, 1915

Received of ..... *Frank O'Malley* ..... *check for* ..... *One Hundred* ..... $\frac{00}{100}$ *Dollars on account*

$100 $\frac{00}{100}$ *Smith, Brown, & Co.*

This indicates that there is a balance still due the firm by Mr. O'Malley.

19. Make out the receipt in full sent by Martin Haupt & Sons on the arrival of Cottier Jones's check.

The following is a form of

Rent Receipt

Chicago, Ill., Mch. 30, 1915

Received of ..... *Martin Haupt & Sons* ..... *Three Hundred Fifty* ..... $\frac{00}{100}$ *Dollars in full of rent to date of premises 138-156 La Salle St.*

$350 $\frac{00}{100}$ *Prentis Fleming*

20. Make out a mechanic's receipt, substituting for "of rent" the following, "for services rendered and materials furnished."

21. Write a doctor's receipt "in full for professional services to date."

Accounts

The following is a form of account kept by a boy who receives 25 cents per day for tasks performed before and after school hours:

CASH ACCOUNT

			Dr.		Cr.	
Feb.	*1*	*On hand*	*1*	*42*		
	3	*Repairs to bicycle*				*75*
	5	*Bananas*				*05*
	7	*Wages for week*	*1*	*75*		
	10	*Penknife*				*85*
		Skates			*1*	*25*
	14	*Wages for week*	*1*	*75*		
	21	*Wages for week*	*1*	*75*		
	23	*Materials for sled*				*60*
	27	*Book*				*25*
	28	*Wages for week*	*1*	*75*		
		Balance			**4**	**67**
			8	*42*	*8*	*42*
Mch.	*1*	*On hand*	*$ 4*	*67*		

The *debit* double column, headed "Dr.," shows all moneys received, and the *credit* double column, headed "Cr.," all payments.

At the end of the month the word "Balance" is written and a line is drawn below it. The footing of the Dr. column is written, and the same amount, $8.42, is written in the Cr. column. The difference between the sum of the credits and $8.42 ($4.67) is entered on the line with the word "Balance." The account is correct if the cash on hand is $4.67. A double line is drawn to close the February account, and the account for March is opened with $4.67 in the debit column.

Personal Accounts

Peter Denyse, a farmer, buys goods of Chambers & Johnson, giving them produce in part payment. The account in the books of the latter takes the following form:

		PETER DENYSE		DR.		CR.	
1915							
Oct.	*1*	*Brought forward*		*12*	*87*		
	2	*To 50 lb. sugar*	*.06½*	*3*	*25*		
	3	*By 1 ton Hay*				*14*	—
		" 20 bu. Oats	*.48*			*9*	*60*
	7	*To 10 lb. Coffee*	*.24½*				
	15	*" 20 yd. Muslin*	*.05¼*				
	20	*By 40 bu. Corn*	*.62*			*24*	*80*
	27	*To Cash*		*20*	—		
	30	*" 3 bbl. Flour*	*6.25*				
	31	**By balance**				**9**	**97**
				58	*37*	*58*	*37*
Nov.	*1*	*Brought forward*		*$9*	*97*		

The Dr. column shows sums due Chambers & Johnson for goods sold Mr. Denyse and a payment in cash. The Cr. column shows value of goods received from the latter. On Oct. 31 the balance Mr. Denyse owes is entered in red ink. On Nov. 1 this amount is entered as a debit.

22. Copy and complete the following account, which shows how the foregoing transactions appear on the books of Peter Denyse. Debits in the foregoing account will appear as credits in this one, and *vice versa*. Begin each credit item a short distance to the right of the date lines.

CHAMBERS & JOHNSON DR. CR.

1915						
Oct.	1	*Brought forward*			12	87
	2	*By 50 lb. sugar*	.06½		3	25
	3	*To 1 ton Hay*		14	—	
		" 20 bu. Oats	.48	9	60	
		etc.		*etc.*		*etc.*
	31	**To balance**		**9**	**97**	
				58	37	58	37
Nov.	1	*Brought forward*				$9	97

Statements

It is customary for the person to whom a balance is due to render a *statement*. This is frequently done at the close of a month in the following form:

INDIANAPOLIS, IND., *Nov. 1, 1915*

Mr. Peter Denyse

In account with CHAMBERS & JOHNSON

1915		*Dr.*				
Oct.	1	*Statement rendered*		12	87	
		To Mdse. (as per bill)		3	25	
	2	" " " " "		2	45	
	7	" " " " "		1	05	
	27	" *Cash on a/c*		20	—	
	30	" *Mdse.*		18	75	58	37
		Cr.				
Oct.	3	*By Mdse.*		23	60	
	30	" "		24	80	48	40
	31	*Balance due*				$9	97

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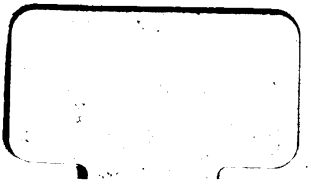
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